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ABSTRACT

The experimental 1973-74 edition of Unit IV consists of 28 life science curriculum activities for 13- to 16-year-old educable mentally handicapped children. The role of the teacher in continuing field trials is noted and environmental themes and elements, inquiry skills, problem solving skills, and applicational behaviors and attitudes are stressed. Directions for using the student records-of-progress and tallysheets are provided for the teachers. The three cores of activities are preceded by suggestions of general aims (e.g., student development of a success syndrome and development of some control over the environment), specific goals, objectives, and a planning guide listing materials needed for each activity. Titles for core A, which contains seven activities on energy and material transfer, include: (1) Making Compost; (2) The Food Chain Game Revisited; and (3) Food Webs in My Community. Titles of some of the activities in Core B--Decomposers in My Environment--are: (1) Starting to Round Up the Food Chain; (2) Talking Rot; (3) Planting in Compost; and (4) A Real Gas. Among the nine activity titles for Core C--Garbage and My Environment--are: (1) Classroom Trash; (2) Every Litter Bit Helps; and (3) The Recycling Pay Off. Activities are organized in terms of materials, teaching strategies, and anticipated student behaviors. An evaluation/feedback form accompanies each activity. (MC/SM)

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EXPERIMENTAL EDITIO

UNIT IV

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Biological Sciences Curriculum Study

LIFE SCIENCES:

A SPECIAL EDUCATION PROGRAM

EXPERIMENTAL EDITION 1973-74

UNIT IV

Transfer And Cycling Of
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Biological Sciences
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Me and my Environment

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Me and my Environment

INTRODUCTION

The project to develop a life science curriculum for the educable mentally handicapped (EMH) was originally funded in the summer of 1969 by the Division of Research, Bureau of Education for the Handicapped, United States Office of Education. The project is charged with writing, field testing, evaluating, and disseminating materials dealing with topics in life sciences for the EMH population in our schools.

ME NOW, the BSCS model life science program for educable mentally handicapped youngsters in the 11- through 13-year age-group, has been
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On the basis of
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which is entitled ME

DEVELOPMENT

Summer, 1971 - Initial writing conference

Academic year, 1971-72 - Initial testing

Summer, 1972 - Revision

Academic year, 1972-73 - Large-scale field test

Summer, 1973 - Revision

Academic year, 1973-74 - Conclusion of field test

Fall, 1973 - Unit I,

Spring, 1974 - Uni

Fall, 1974 - Uni

Spring, 1975 -
Environment

Fall, 1975 -

Spring, 19

age-group, has been released and is available from Hubbard Scientific Company of Northbrook, Illinois.

On the basis of the success of the ME NOW program, and in anticipation of meeting further student and instructor needs, the Bureau of Education for the Handicapped has provided the BSCS with a three-year continuation grant to develop model materials for 13- to 16-year old EMH students. Recognition by the educational community of the need for special emphasis on matters of environmental concern led the BSCS staff to decide early in the project that a portion of the materials for EMH students should focus on environmental studies. The time line for developing this new curriculum, which is entitled ME AND MY ENVIRONMENT, is shown below.

COMMERCIAL RELEASE

Fall, 1973 - Unit I, Exploring My Environment

Spring, 1974 - Unit II, Me As An Environment

Fall, 1974 - Unit III, Energy Relationships In My Environment

Spring, 1975 - Unit IV, Transfer And Cycling Of Materials In My Environment

Fall, 1975 - Unit V, Air And Water In My Environment

Spring, 1976 - Unit VI, Populations And Societies

THE ROLE OF THE TEACHER IN THIS EXPERIMENTAL EDITION

This curriculum has been written for and by teachers; it was tested and modified by teachers. enthusiastic teachers for this development, testing, and modification. Twelve of these teache Thirty-nine more were selected as experimental teachers to provide the best possible field tes providing feedback for the revision depended heavily upon the resourcefulness of these teache

In the continuing field trials, teachers have several responsibilities, including:

1. Implementing the strategies and activities exactly as they are written. Only when all tea analysis of results be depended upon to reveal strengths and weaknesses of the program.

2. Developing a feel for the inquiry strategy, the flow of activities, and the ultimate stude around. Through their understanding of this rationale, the test teachers can make an inva some activities, the modification of others, and the invention of new ones that will enabl

3. Providing timely, accurate, and detailed feedback that specifies strengths and weaknesses, for each activity.

The following outline will provide you with an overview of the six major components of the pro

1. UNITS IN ME AND MY ENVIRONMENT

UNIT I. EXPLORING MY ENVIRONMENT	UNIT II. ME AS AN ENVIRONMENT	UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT	UNIT IV. TRANSFER CYCLING MATERIAL MY ENVIR
Investigating the Visible Environment Landmarks in the Visible Environment Sensing the Invisible Environment Looking at the Invisible Environment	Microbes and Me Disease in People Environments Environmental Choices and Chances (Drugs, Alcohol, Smoking)	Introduction to Energy Energy in Food Energy Flow through Food Chains and Webs Food Making in Plants	Energy and Materia Transfer Decomposers in My Environment Garbage and My Environment

ON

rs; it was tested and modified by teachers. The BSCS has found highly skilled, flexible, and
, and modification. Twelve of these teachers served as writers to help create the materials.
hers to provide the best possible field test of the curriculum. The success of these tests in
y upon the resourcefulness of these teachers.

al responsibilities, including:

tly as they are written. Only when all teachers use the curriculum as prescribed can the
strengths and weaknesses of the program.

flow of activities, and the ultimate student behaviors that the curriculum is organized
tionale, the test teachers can make an invaluable contribution by suggesting the extension of
d the invention of new ones that will enable their students to achieve the objectives.

ck that specifies strengths and weaknesses, modifications, alternatives, and student responses

view of the six major components of the program:

NIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT	UNIT IV. TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT	UNIT V. AIR AND WATER IN MY ENVIRONMENT	UNIT VI. POPULATIONS AND SOCIETIES
ntroduction to Energy nergy in Food nergy Flow through Food Chains and Webs ood Making in Plants	Energy and Material Transfer Decomposers in My Environment Garbage and My Environment	Uses of Water Sources of Water Preparation of Usable Water Water Management Components of Air Changes in the Air Additives in Our Air	Interactions within a Population Population Size and Complexity Effects of Overpopulation Population Control

Me and my Environment

2. ENVIRONMENTAL THEMES

- Interrelationships of Environmental Components
- Diversity and Patterns
- Complementarity of Organisms and Environment
- Flow of Energy
- Cyclic Nature of Processes
- Finiteness of Resources
- Ecological Trade-Offs
- Interrelationships of Environmental Components
- Population Dynamics

3. ENVIRONMENTAL ELEMENTS

- Space
- Shelter
- Living Things
  - (Plants)
  - (Animals)
  - (Microorganisms)
- Energy
  - (Food Chains)
- Air
- Water
- Man

4. INQUIRY SKI
according t
difficulty

- Observing
- Identifying
- Associating
- Describing
- Comparing
- Translating
- Inferring
- Applying
- Predicting
- Speculating
- Value Judgi
- Comparing

BSCS

NTAL ELEMENTS

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4. INQUIRY SKILLS (Ordered according to assumed difficulty level)

Observing

Identifying

Associating

Describing

Comparing

Translating

Inferring

Applying

Predicting

Speculating

Value Judging

Comparing

5. PROBLEM-SOLVING SKILLS

Experimenting

Knowing What the Problem Is and What to Do to Solve It

Recording Data

Discussion and Treatment Of Group Data

Organizing Data

Explaining, Defending, Answering Why Questions

Asking Questions

Identifying Variables

Identifying Controls

Interpreting Results

Drawing Conclusions

6. APPLICATIONAL BEHAVIORS AND ATTITUDES (No order of importance is intended)

The student develops:

- --vocabulary skills.
- --a success syndrome.
- --skills of observation.
- --an attitude of inquiry.
- --a sense of self-identity.
- --skills in conserving water.
- --skills in the hygienic care of his own body.
- --skills in participating in group discussions.
- --the ability to manipulate water treatment systems.
- --skills in applying science experiences to everyday life.
- --skills in the selection, preparation, and storage of food.
- --a recognition of his own role in creating an acceptable life style.
- --an ability to distinguish between healthful and unhealthful environments.
- --an appreciation of the community service provided by public utility systems.
- --an understanding of the interrelationships between environmental components.
- --skills in functional, receptive, and expressive communication about his environment
- --skills in employing systematic problem-solving techniques to persistent problems o
- --skills in recognizing environmental landmarks and utilizing these for orientation a
- --a recognition of his social dependence on others and his biological dependence on t

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marks and utilizing these for orientation and mobility.

n others and his biological dependence on the environment.

Me and my Environment

In May 1971, a planning conference was held to prepare guidelines for the development of ME AND MY ENVIRONMENT. The conference was attended by the five members of the advisory committee, four of whom are in the field of special education and the fifth in biology; by the project writing team, consisting of five special education teachers and five biology teachers; and by the BSCS project staff. Conferees developed guidelines covering areas of environmental concern and utility for the target population of children, the characteristics of this population, and the needs of these children that might be met through environmental studies. A multidimensional model incorporating the science content, cognitive and affective behaviors, environmental themes, contextual focus, and needs of the children resulted from the planning conference. Following the conference, the BSCS project staff prepared a proposed content and objective outline for the curriculum. A thorough study was made of the existing literature covering the physical, social, and psychological needs of handicapped adults; the staff then attempted to identify which of those needs might be met by ME AND MY ENVIRONMENT.

SOME GENERAL OBJECTIVES

The identification of needs led to a statement of general objectives. The first four were adopted as a broad benchmark against which all activities were judged.

1. To help the mentally handicapped child develop interests, skills, and positive attitudes through experiences with scientific - especially biological - concepts.

2. To provide the mentally handicapped child with challenging intellectual activity at a level commensurate with his ability to respond effectively.

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3. To aid the child in establishing functional modes of living through heightened observation, a well-developed curiosity, an increased measure of self-confidence, and a sense of responsibility to and for his environment.

4. To contribute to the development in the child of a higher level of social maturity and emotional stability that can lead to increased vocational proficiency, realistic self-concept, creative self-expression, and more effective assimilation into the community.

5. To develop in the child a knowledge of himself in relation to his environment, along with a tendency to apply this knowledge to the tasks of everyday living.

6. To contribute to increased knowledge about the learning characteristics and limitations of the educable mentally handicapped pupil, and about effective strategies for instruction.

BASIC ASSUMPTIONS UNDERLYING THE DESIGN FOR THE CURRICULUM MATERIALS

In the initial discussions with the special education community, some basic assumptions for the development of the life science materials were identified. These were revised somewhat, based on the development and testing of ME NOW, to form the underlying assumptions for the development of ME AND MY ENVIRONMENT.

1. Ideas must be developed with a minimum of reading on the part of the student.

2. Vocabulary, where possible, should involve *functional* rather than *technical* language, although technical names are taught when these may be useful to the student.

3. Entry points should be concerned with concrete, tangible "things," rather than with abstract, intangible ideas or concepts.

4. The classroom environment and the materials should not be cluttered with distractors; however, a variety of perceptual modes and instructional media should be used (e.g., sight, touch, smell, etc.).

5. Activities should be developed in small, discrete units that build on or reinforce a concept or skill.

6. Learning, for the EMH student, requires slower pacing, greater redundancy, and time for participation by each student. The instructional materials should be student-doing rather than student-watching.

7. An activity must involve the student in ways of applying the desired behavior; transfer cannot be assumed.

8. EMH children need, and can respond effectively to, an activity-oriented instructional approach.

9. The curriculum should be designed to provide students with an experience in science as inquiry, through the exploration of their environment.

10. Most teachers of the Educable Mentally Handicapped will need specific directions in using inquiry strategies for teaching science concepts.

11. The teachers of the Educable Mentally Handicapped, for the most part, are not science-oriented; therefore, the materials should be specific with regard to science techniques.

12. The materials and methods must permit or provide attention to individual differences and to specific learning characteristics of the population.

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13. To achieve the objectives, designers of the materials should attempt to create a balance between detail and motivation; that is, the amount of minute and abstract detail that can be learned is probably a function of the interest and motivation that can be established to deal with it.

MAJOR AIMS FOR ME AND MY ENVIRONMENT, A JUNIOR HIGH EMH SCIENCE CURRICULUM

The curriculum includes instruction related to the personal well-being, self-worth, confidence, and successful coping of each person to meet persistent daily life problems. The major aims are:

1. Development in each child of a sense of identity as a person who has some degree of control over and can act on his environment. This will lead to a degree of self-determination based on a rational coping with situations rather than on a passive compliance or an impulsive response to problems.

2. Development in each child of a success syndrome. More than anything else, each activity is intended to be a success experience for each child. It is the teacher's responsibility - almost obligation - to see that each child succeeds at a level that is challenging to his abilities and that preserves his self-respect. It is a further responsibility of the teacher to point out his achievement. As a group, the students should help each individual fit what he has done into a pattern of accomplishment.

The curriculum is intended to be intellectually stimulating, and exploratory for each student, and to induce him to become actively involved. It should encourage the following outcome:

3. Development in each child of an interest that could become a hobby or avocation over a lifetime (through an exposure to an array of experiences in science). It is hoped that many children will find some

area - perhaps growing plants, caring for animals, identifying flowers, collecting things, or simply enjoying outings into the country - that they feel strongly about and can develop some competence or knowledge in. This would provide a means of self-expression, and (perhaps) allow some degree of sharing or involvement with others.

The curriculum is organized around eight ecological themes. There are some specific content objectives related to these. The ultimate objectives are:

4. Development in each child of a sense of relationship and empathy with other living things. It is hoped this will lead to a positive regard and caring about what affects them as individuals and as a group, because what affects them affects the community of man.

5. Development in each child of an understanding of environmental conditions that will lead to a sense of responsibility for the environment and actions that protect or improve it.

These are the five overriding aims that should serve as reference points for teachers and guide much of what they plan to do in the classroom. One of the older junior high students in a first-year test class expressed his feelings about the class and himself in this way: "I just feel that if we want these kids to improve, and that's the whole idea of it, you have to bring these kids a certain amount of happiness. You have got to make them feel that they are really wanted. If they are wanted, they will try a little harder. That sounds kind of childish, I suppose, but it works...Another thing...always inspire: 'Come on, put your best foot down - try it again.' You know, things like that. I mean, to me, just the tone of voice makes the difference to me about going out or staying in the class. I just feel that they don't want me - and they don't, (when their tone says) 'Oh, Eddie! Why did he have to come today?' "

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ENVIRONMENTAL THEMES

Since the original planning conference for the development of ME AND MY ENVIRONMENT, eight ecological themes have emerged which seem to encompass the major ideas and concepts (i.e., the science concept) that the curriculum development team sees as appropriate for this student population. These themes are broad generalizations, some understanding of which appears to be a prerequisite for coping with one's own environment as well as with society's environmental problems. The themes are probably best thought of as unifying threads which run throughout the curriculum.

1. INTERRELATIONSHIPS OF ENVIRONMENTAL COMPONENTS

When we try to pick out anything by itself, we find it hitched to everything else in the universe. John Muir

Life is entirely dependent upon the things that the environment supplies: air, water, food, shelter, and subtle things such as a suitable temperature and humidity. Animals depend upon other animals or plants for food. Scavengers (carrion and detritus feeders) and decomposers (bacteria and fungi) obtain their nutrition from the remains of living organisms. Green plants depend upon sunlight, air, water, and minerals from their environment and form the base upon which all organisms are interconnected by food chains and complex food webs.

Organisms interact with each other, and with the environment, in a variety of ways in addition to the eater-eaten relationships of food chains or webs. Plants compete with each other for light, water, soil nutrients, and growing space. Animals compete for available food resources, space, and shelter. Other relationships include parasite-host and pathogen-host interactions.

The important consequence of this theme is that actions are not singular, nor do they have singular impact. Man's competitive interactions have far-reaching, often unknown consequences. For example, clearing land for raising agricultural crops destroys the habitat for plants and animals and disrupts certain food webs, while establishing a suitable habitat for agricultural species. The resulting monocultures are often vulnerable to attack by pests because populations of natural predators have been removed. Attempts to control these competitive organisms through applications of pesticides may simply aggravate the situation by killing nontarget organisms such as predators, scavengers, and decomposers which are actually beneficial. Similarly, herbicides used in control of weeds which are competing with crops may destroy habitats for natural predators, making additional applications of insecticides necessary; these in turn may kill more nontarget beneficial organisms. Numerous studies have shown that large-scale, indiscriminate use of pesticides may, in the long run, actually decrease agricultural productivity. In addition, manufacture, transport, and application of pesticides and fertilizers contribute to air and water pollution, thereby adding to the degradation of vital resources upon which all life depends. This is but one simple example of a myriad of possibilities. If we expect students to start thinking in terms of consequences, it is imperative that they realize and appreciate that life depends upon interrelationships and that apparently simple actions may have far-reaching implications.

2. DIVERSITY AND PATTERNS

There is great diversity in the environment. Differences in climate and topography lead to different environments with different communities of plants and animals. The plants and animals differ as they have become adapted to do somewhat different things, or even to do similar things but in different environments. Even within one species there is diversity. But it is possible to find patterns within all this diversity. Recognizing patterns helps one get his head around a bewildering variety of things. All environments have

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If one looks at the organisms in any habitat, he discovers a variety of sizes, shapes, and colors. Further examination will reveal groups of organisms that are related in various ways; e.g., some produce food (producers) while others feed upon these producers (consumers). We find that the organisms are all related in a pattern forming a food web.

Diversity is thought to enhance the stability of a system, for it provides alternate channels of energy or materials flow if part of the system is lost or overburdened. For example, consider a single food chain: plants, grasshoppers, frogs, snakes. If one link in the chain is lost - e.g., the grasshoppers are wiped out by insecticides - all links beyond that one will also be lost if they have no alternative sources of food. In a complex food web, however, a link may be lost without destroying the system; links beyond the missing one may turn to another channel for food - and in the example, the frogs may exploit another type of insect food resource. Thus, preserving diversity may be necessary in preserving the stability of the life-support system of the biosphere. Man cannot exist alone.

It is often said that variety is the spice of life. Diversity makes the environment less monotonous and more interesting. This aesthetic component should receive emphasis in the curriculum.

3. COMPLEMENTARITY OF ORGANISMS AND ENVIRONMENT

A complement is something that completes or fills out another thing. Complementarity in this context refers to the completion each part brings to the other, when each is dependent upon the other. Some interdependent relationships have two components; others three, four, ten, or even a hundred or more. A few examples should clarify the meaning of the theme.

Organisms use material things from the environment and, in turn, recycle things back to the environment, where they may be used by other organisms. Thus, the presence of organisms modifies the environment in various ways, some of which make the environment more suitable for other organisms. Plants use carbon dioxide and release more oxygen than they use. Consumer organisms (animals, decomposers) use oxygen and release carbon dioxide. Both the producers and consumers are dependent upon the environment for these resources, and the balance of these materials in the environment is likewise dependent upon both groups of organisms.

Without scavengers and decomposers there would be a prodigious accumulation of the remains of once-living organisms cluttering up the environment. Probably all of the available carbon, oxygen, and other essential elements would be tied up in these dead remains. Life would have come to a screeching halt a long time ago!

The presence of plants improves the water-holding capacity of a watershed and helps prevent erosion of the soil by wind and water. Plants reduce the rate of evaporation of soil water but at the same time release it to the atmosphere. Thus, plants play a vital role in the water cycle and influence local climates through the regulated flow.

Plant succession is a classic example of complementarity. An abandoned field, new roadside, or similar disturbed area is quickly invaded by hardy pioneer plants which we usually think of as weeds. As these grow, die, and decay, they modify the immediate environment and are replaced by plants which are better adapted to the new conditions. These, in turn, cause further modifications and are replaced by other populations; finally a relatively stable community exists that is able to replace itself and that is in dynamic equilibrium with the environment. Such communities are usually referred to as climax communities.

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4. FLOW OF ENERGY

> *The biotic stream is capable of flowing in long or short circuits, rapidly or slowly, uniformly or in spurts, in declining or ascending volume. Ecology calls this sequence of stages in the transmission of energy a food chain, but it can be more accurately envisioned as a pipe line...(which) leaks at every joint.* Aldo Leopold

Energy is required to do work; that is, to cause movement requires energy. Indeed, to do anything requires energy. Life depends upon this continuous flow which is initiated by a constant input of energy from the sun, its photosynthetic transformation from light to chemical energy by the producer organisms (green plants), its passage from organism to organism along various food chains (in their more complex food webs), and its eventual loss as radiant heat to outer space. Each time that energy is converted or transformed, at each step along the way, some of it is lost from the system and is no longer available to do useful work. This, in simple terms, is the second law of thermodynamics. Green plants are able to fix photosynthetically only a portion of the sun's energy that they intercept. In turn, some of the energy which they trap and store is used by the plants for such things as growth, reproduction, and the movement of materials. Thus, only a portion of that original stored energy is available to the organisms which eat the plants. These organisms likewise use energy in their various life processes so that only a small portion of the energy which they received from eating plants is available to their predators. As a consequence, only about one-tenth of the energy at any step in a food chain is available to the next level. An acre of agricultural land will provide enough food energy for about 1.5 persons for a year if planted in wheat, but will feed only 0.1 person if used to raise beef cattle!

Society's use of fossil fuels is simply a utilization of energy captured and stored over millions of years by green plants. As such, this source of energy is in finite supply and is a nonrenewable resource.

Electricity generated by fossil fuel-burning plants can similarly be traced to the sun. Hydroelectric plants offer a limited alternative source of electricity. This source is also finite because of the limited number of adequate sites. The planned use of nuclear fusion reactors (which are simply a duplication on earth of the natural processes taking place on the sun to release energy) offers an alternative source of energy (again sought as electrical energy) for society; this source, however, as with all others, is governed by the laws of thermodynamics. The energy, once released, flows through the system and is eventually lost to space as heat. Hence this source is also finite, but it is a very large source. The exploitation of nuclear energy is fraught with unanswered questions and problems. How can we safely contain and shield the radioactive processes of fusion? How can we safely dispose of the radioactive wastes from the "temporary" fission reactors being used until fusion reactors, which produce little waste, are perfected? Can the earth dissipate the huge amounts of waste heat generated? What effects will this heat have on climates, ecosystems, and organisms?

It should be emphasized that nuclear energy offers little hope, at present, of replacing the sun as a life-supporting source of energy. In the forseeable future, man's only source of food energy will be the sun, through photosynthesis of green plants.

5. CYCLIC NATURE OF PROCESSES

> *All the rivers run into the sea, yet the sea is not full.* King Solomon

In contrast to energy, materials (matter) are continuously recycled from living to nonliving systems and back to living systems again. Materials necessary for life are in finite supply, and if they were not constantly cycled, life would simply run out of resources and cease. Some examples include the water cycle, the carbon dioxide-oxygen cycle, the nitrogen cycle, and the cycling of various essential minerals such as calcium, potassiu
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Man's present exploitation of consumable resources, in most cases, upsets these natural cycles. The manufacture and ultimate discarding of nonbiodegradable products removes important elements and compounds from the natural cyclic processes of the ecosphere and could ultimately lead to the exhaustion of such resources for the life-support system. Burning of fossil fuels is changing the natural balance of carbon dioxide in the atmosphere, with the consequences largely unknown. Degradation of air and water through pollution and the application of pesticides destroys organisms which are vital to cyclic processes.

6. FINITENESS OF RESOURCES

Everything has to come from somewhere. The earth has been likened to a spaceship because of its finite supply of all material resources. Inasmuch as life depends upon a continued supply of resources, things have to be used over and over. Continued exploitation of any resource will lead to its exhaustion unless that resource is recycled. The demands of today's technological societies are placing tremendous burdens on the earth's resources and, at the same time, the wastes generated are making other resources unavailable or unfit for supporting life. Projections indicate that we will have depleted our supply of fossil fuels and several important metal resources early in the next century.

Through photosynthesis, food is a renewable resource so long as the natural cycles are able to resupply the raw materials necessary, and so long as environmental conditions necessary for plant life are maintained. But, the amount of food that can be produced on the earth at any one time is finite! There is only so much area available, only so much sunlight that can be intercepted, and only so much of the required raw materials available.

The consequence of this theme is that an indefinite continuation of growth and an increasing use of resources is impossible when the supply of all resources is finite. This is true of population, food consumption, resource utilization, technology, gross national product, or any other parameter which one chooses to measure. And all noteworthy predictions indicate that we are very rapidly reaching the limits of growth. Most of us will probably experience the dire consequences!

7. POPULATION DYNAMICS

A population refers to a collection of individuals of the same species occupying a given space at a given time. The size of living populations is determined by four factors: rate of birth, rate of death, rate of immigration, and rate of emigration. Populations tend to grow geometrically (e.g., 2, 4, 8, 16, 32,...) to the limit (carrying capacity) of their environment as determined by the available food, space, predation, and disease. They then either level off and exist in some fluctuating equilibrium with other populations, or they crash back to some low level. A common misconception is that all biological populations tend to follow the first pattern: growth which is described by an S-shaped curve up to the carrying capacity, followed by a fluctuating equilibrium. There are, however, many biological populations which dramatically overshoot the carrying capacity of their environment and, as resources are rapidly depleted crash back to a low population level. A blowfly population is a good example of the latter. Upon arrival at a carcass, the population increases rapidly, completely overshooting the carrying capacity or the environment's capacity to sustain the population for any appreciable length of time. As the food resource is quickly depleted, the population crashes back to the low level of a few adult flies who are searching out a new carcass to feed upon.

The strategy is simple - exploit the environment for all it's worth while it is here and hope that a few of the many adults produced in the process will survive long enough to make it to the next carcass. There is evidence that the
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is evidence that the characteristics of human population growth are similar to those described for the blowfly, and our present exploitation of the earth's resources is certainly analogous to the strategy employed by the blowfly. Such a strategy can only be disastrous for mankind. The earth is the only carcass we have.

Since resources are finite, no population can continue to grow forever. The human population has grown geometrically over the past few centuries. Doubling time of the human population is currently less than 35 years, and the most optimistic estimates indicate that this population will exceed the carrying capacity of Earth within a century (some suggest that we have already passed the carrying capacity and many demographers and ecologists have predicted a crash in the human population prior to the year 2020). *Population control and zero population growth will be accomplished*, either by self-imposed means or by natural means. If the latter, it will occur through starvation, disease, war, or lower fecundity - or a combination of these. There is no plausible alternative!

Perhaps the greatest service that this curriculum could hope to perform is to help this population of youngsters understand the implications of population growth and the necessity for limiting family size. But, to achieve the desired end, the curriculum must provide the students with an understanding of the ways and means by which family size may be controlled. This is one area where individuals can make decisions, can have an influence, and can contribute to the solution of what may be mankind's most pressing problem!

8. ECOLOGICAL TRADE-OFFS

Every coin has two sides.

As we have seen, all environmental components are interrelated in intricate, complex ways. No action has singular impact, and thus any course of action must be carefully weighed and alternatives considered. Any course of action involves ecological trade-offs.

For example, consider society's use of electricity. Many of us enjoy a life style which is very closely tied to the conveniences and labor-saving devices powered by electricity. The generation of that electricity is a major factor in environmental degradation. By and large, we have made the decision to forego a certain amount of environmental quality to enjoy the leisure and convenience of electrical appliances. Projections indicate that increases in demand for electrical power will require strip mining vast areas of Wyoming and Montana, exploiting oil shale reserves of Colorado, depleting the petroleum reserves of the Alaskan north slope (with the inherent dangers to the arctic tundra), and constructing large numbers of nuclear power plants. In all of these activities, we will trade off various amounts of environmental quality.

INQUIRY PHILOSOPHY

We do not view science as a collection of facts, but as a process by which facts are gathered, interpreted, and organized into conceptual schemes. We have included facts, and activities structured to generate facts, not for their intrinsic value but to provide the means by which concepts and generalizations are developed through an inquiry strategy.

Inquiry, simply defined, is finding out why. Inquiry may be defined as a process of questioning, or seeking information, of discovering. For EMH students, as for others, the excitement of discovery adds meaning to learning. Inquiry allows the student a natural avenue for satisfying his curiosity about his world. An inquiry strategy is one which poses a question or problem and then guides students through *inquiring kinds* of behaviors such as observing, describing, identifying, comparing, associating, inferring, applying, predicting, translating, guessing, speculating, creative thinking (divergent production), and value judging.

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experiences and background information, answers the question. At the other extreme, the student poses the question after being given a certain amount of background information, and then proceeds to answer the question by designing an experiment, conducting the experiment, and interpreting the results.

All degrees of inquiry have a common ingredient: the answer is not given, but is arrived at by the individual after he has analyzed information relevant to the question. The distinction is obvious - in inquiry strategies the questions are answered by the students and not the instructor.

If knowledge is acquired, at least in part, through an inquiry strategy, then the student should be able to use that strategy in acquiring further information and solving future problems as they arise. He will be more able to seek answers to other questions through his ability to acquire and interpret information.

INQUIRY SKILLS

1. OBSERVING is a fundamental activity of scientists. The accumulation of information which may lead to knowledge comes primarily from what we see, hear, taste, smell, or touch. A major function of this curriculum should be to offer a rich and varied environment of concrete experiences for the students. As students gain experience, accuracy in observing and recording the details of their findings should be increased. Observing should frequently include an element of divergent production by asking the students to heed all of the details, extraneous and otherwise, that they can. Opinion, interpretation, and speculation are not, of course, a part of observing.

2. IDENTIFYING involves the recognition of what something is or of certain properties that make it possible to categorize the thing. Included in identifying is the matching of a name or definition with an object, the use of a key or guide, and the recall of a label from previous experience.

3. ASSOCIATING involves seeing what things go together - seeing relationships or recognizing common properties. Associating may be thought of as a prerequisite to classifying, or organizing data or information for some purpose. Grouping (classifying), through associating, may enhance conceptualizing.

4. DESCRIBING involves writing or relating orally all of the relevant observations about a thing so that another individual would be able to use the description to identify the object or share in an event he did not actually experience. Emphasizing description should enhance development of observational skills.

5. COMPARING involves the inspection of two or more objects (events) to note similarities and differences. It is closely related to the student's ability to distinguish between critical differences and to generalize recognizable similarities. This skill could involve the use of referents other than the things compared. It is necessary that one have an understanding of such comparatives as hotter-colder and smaller-larger, as well as a comprehension of their related values, e.g., warmer-cooler and littler-bigger.

6. TRANSLATING is the skill in which recorded observations are expressed in another symbolic form. The conversion of tabular information into a graph or of a verbal description into a drawing exemplifies this.

7. INFERRING involves going beyond the information or evidence at hand to presume a cause or an effect, or to answer a question. It requires extrapolation, may or may not be based on implication, and is closely related to two of the problem-solving skills: interpreting results and drawing conclusions.

8. APPLYING involves the use of a learned task or skill in a situation other than that in which it was originally learned. For example, if a child has
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if a child has learned to orient the top of one map with north, an application would be to orient another map with respect to north.

9. GUESSING is the generation of ideas about outcomes in a data-poor situation. The limited evidence, common sense and hunches are all involved in making the most informed judgment one can.

10. SPECULATING is the generation of ideas about the nature or outcome of a hypothetical situation. Even though the situation is unobserved, it may be reasonable to consider based on past experiences. Possibly a great deal is known about the subject - but without having observed the particular event, one must describe it from imagination.

11. PREDICTING is the skill of making informed estimates of what should happen in a given situation, based on knowledge of what enters into the situation and previous experience.

12. DIVERGENT PRODUCTION refers to the process of generating as many ideas about something as possible.

13. VALUE JUDGING involves more than simply expressing opinions or preferences. It is the comparison of things and the assignment of relative value to them, based upon some set of criteria. In this curriculum, the WHY of valuing should be sought.

PROBLEM-SOLVING SKILLS

Inquiry is the cognitive process of finding out WHY. The mechanism whereby this is accomplished is problem solving. The ME AND MY ENVIRONMENT science curriculum is a structured sequence of activities that enables the student, through success, to learn to seek the answers to WHY. It is hoped that the experiences provided in the curriculum will help the student face and solve the problems of everyday life, both now and later.

There are at least three levels of mastery of problem-solving skills. The minimum level is an *awareness* of the skills. The second level is the functional ability to perform them. The highest level is the ability to design an original experiment and carry it to completion. It should be borne in mind that problem-solving behavior is a complex package involving past experience, motivation, cognitive development, and other factors. The development of problem-solving skills should be closely related to the appropriate inquiry skills, concepts, and other organizers of the curriculum.

A brief description of the intended interpretation of the problem-solving skills follows in what we consider to be a hierarchy of easiest to most difficult.

1. EXPERIMENTING, or doing something to see what happens. This skill represents the use made of the opportunity to "mess around" with a given piece of apparatus or set of materials, to pursue individual curiosity or interest, to follow a suggested line of inquiry, and in general, to find things out.

Some examples of experimenting include: investigating the properties of environmental objects (e.g., which ones will float, which ones can be burned, which are natural and which are man-made), having the opportunity to use thermometers or balances, raising a classroom pet or plants, burning things under a pinwheel, comparing objects as sensed by touch and by eyesight, and so on.

It is important to distinguish between experimenting as we have defined it and the formal aspects of experiment and experimental design. Note that the formal aspects are dealt with as a separate category and that designing experiments is thought to be the most difficult of the problem-solving skills.

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To encourage development of the beginning skill of exploration or experimenting, instructions are frequently given in the following form: "Give the students an opportunity to manipulate and experiment with the balances." "Capitalize on student interest by letting everyone observe and handle the pets," and so on.

2. KNOWING what the problem is and what to do to solve it. Defining the problem and its parts clearly is an important first step in any problem-solving situation. Yet the recognition and definition of a problem represents a difficult task for this student population, and it has been placed high in the problem-solving skill hierarchy (see Number 12). Knowing or recognizing the problem given guidance (or the defining events and clues for everyday problems) is not as difficult, and students are assisted through many experiences in recognizing that a problem exists, in thinking about that problem, and in understanding how answers to it might be obtained. This skill must be emphasized (that is, understanding the problem) for the logical development of those skills which follow. The student must know the question under investigation and clearly comprehend the methods to be used in attempting to answer that question. The materials should emphasize (for both teachers and students) that science is a process of finding answers to questions. There is a subtle difference between stating a question to suggest its answer (e.g., "To see if it is warmer in the sun or in the shade") and stating it as a problem to investigate (e.g., "To see if there are differences in the temperature of different parts of the environment, and to try to find out why if there are").

3. RECORDING DATA Questions of science are answerable through observation and collection of data pertinent to the question. Recording of observations is a necessary skill to enable the investigator to recall the observations and discuss and interpret them in view

of the questions. Included here is the collection and transcription of information called for by the question: making sketches, notes, taking pictures, recording sounds, and recording measurements.

4. DISCUSSION AND TREATMENT OF GROUP DATA - COMPARING RESULTS A look at the outcomes of each student's or student group's investigation, and a discussion of why one result may differ from another, should emphasize the dynamics of group discussion and dialog rather than recitation and monolog. Discussion of variability of results should assist students in the identification of variables which may influence outcomes. The ability to express or talk about what was done is the skill involved here, with students operating primarily at the observing, identifying, describing, and comparing levels of cognition. Discussion of individual or group results provides the teacher with an opportunity to assess student understanding of the investigation and to recognize possibilities for further investigation, alternative activities to re-emphasize particular concepts, or review.

5. ORGANIZING DATA The ordering and grouping of recorded information makes it easier to interpret and see relationships. Included in this category are tabulation of data, averaging or deciding on best estimates, any visual representation such as line or bar graphs, and pictures or schematic representations. This is the most difficult of the skills directly related to data. For students to become proficient in organizing data often involves the inquiry skill of translating information into a different symbolic form.

6. EXPLAINING, DEFENDING, AND ANSWERING *WHY* QUESTIONS Here discussion is at a more sophisticated level than that previously considered. Explaining should assist in the development of the idea of cause and effect. It implies the students' understanding
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of the question, the procedures, and some ability to interpret results. Defending encourages confidence in one's procedures and interpretation of outcomes. Answering *why* questions requires an understanding of the questions and the tasks and ensures that students will analyze their data and make interpretations. Such questions as "WHERE DID THE HEAT ENERGY COME FROM?" "HOW DO YOU KNOW?" and "WHY ARE YOU TAKING THE TEMPERATURE OF ALL THREE CONTAINERS?" fall into this category. To answer such questions, the students must often operate at the inference level of cognition.

Specific examples of such questions are included in the *Teacher's Manual*. It seems particularly appropriate for the teacher to be asking individuals or groups these kinds of questions as they proceed with an investigation. In preparing the manual we emphasize, by providing questioning strategies, that discussion of this sort with individuals and small groups is an effective method of instruction which provides immediate feedback to the teacher.

7. ASKING QUESTIONS This category refers to student questions which are raised as a result of their observations, experiences, and experimenting. Teachers are given examples of the kinds of questions that students may raise and suggestions of how such questions should be dealt with.

8. IDENTIFYING VARIABLES Identification of those variables which may influence the outcome of an investigation is necessary if one is to understand the concept of a controlled experiment, make any sort of an appraisal of its design, and make an intelligent interpretation of its results. The first step toward these goals is to realize that many factors may influence an outcome, and to recognize and identify some of these factors. Students can learn much by asking about what affected the results. This skill is closely related to predicting.

9. IDENTIFYING CONTROLS Once the students are able to identify variables that may influence an outcome, the idea that all variables except the one under investigation must be held constant can be developed.

10. INTERPRETING RESULTS This is perhaps the most important of the problem-solving skills, and may be the most difficult to develop. Explicit models for teachers and students are provided. They deal with the data collected and interpret it in terms of the question asked. Emphasis is placed on recognizing the limitations of data and that the data may or may not have answered the question; on not going beyond the data; and on recognizing the need for further investigation if the need exists. Teachers are cautioned to avoid the temptation to ignore the data and simply provide "the answer."

11. DRAWING CONCLUSIONS Interpretation of results may warrant drawing conclusions. The emphasis here is on drawing only those conclusions that are supported by the data collected. Some forced conclusions are inevitable because of the difficulty of providing experimental evidence; however, great care is exercised to avoid forced conclusions for experiments that have provided all their own relevant data.

12. RECOGNIZING PROBLEMS AND FORMULATING QUESTIONS This skill is a necessary prerequisite for the general application of the other problem-solving skills outside the classroom situation. In other words, if we expect students to apply the problem-solving skills to their daily problems, it seems necessary that they be able to recognize that a problem exists and to state an appropriate question. To develop this skill, they are engaged and involved with events or phenomena that present an identifiable problem, and are given the opportunity to define that problem.

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13. DESIGNING EXPERIMENTS Once the students are able to recognize a problem and formulate a question, an experiment to answer that question may be designed. The design should include identification of variables and controls, methods for observation, gathering data, organizing and presenting data, and so on. It is assumed that this student population will be able to develop this skill only after a great deal of experience with the preceding ones.

SPECIFYING STRATEGIES FOR INSTRUCTION

The model for inquiry used in these materials specifies without exception a classroom climate in which the teacher is a catalyst and observer, and the students the active center of everything going on. Individually or in small groups the students are engaged in learning with the materials and activities of this program, and the teacher is pivotal in organizing, coordinating, *questioning and eliciting*, and observing - but not in telling. The teacher must be totally conscious of a role in providing the stimulus, while the student is generally unaware that he is being manipulated by strategy. The elicited student behavior may be *attitudinal, cognitive, or psychomotor: verbal or nonverbal*.

To communicate effectively with the teacher, we feel we must carefully describe as much as possible of the *pattern of interaction* upon which the anticipated results depend. The whole intent of this curriculum would be defeated if this pattern is not understood and implemented. We know, for example, that teachers often do not provide children the opportunity or the time to think for themselves when a problem is posed. They also frequently impose their experience, observations, and interpretations on children rather than allow the children to express *their own* views of things observed. We hope, therefore, to provide for teachers a model of strategy in these materials that will - if initially studied and used - demonstrate the benefits we describe for it in terms of student response and learning behavior.

We do *not* anticipate that we can predict all that will occur with individual students in the classroom. We hope that we can, however, provide enough reminders to help the teacher deal with unexpected or unpredicted events in the same mode in which the materials are written.

LEVELS OF GOALS AND OBJECTIVES

Unit Goals

Unit goals are broad general statements that define long-term goals of a major portion of the unit. An initial statement, "The student will," is understood in each of the goals. They are defined as statements that capture the intent and emphasis of the curriculum. They also serve the function of organizers toward which the core objectives are directed.

Core Objectives

The core objectives (stated in student behaviors) refer to the desired outcomes for sequences of activities. The role of these objectives is to summarize what the student will be able to do as a consequence of each of the activity sequences. The core objectives provide a cognitive map for the teacher to extend or elaborate on. These core objectives may also serve as evaluative guides to assess short-term progress and attainment of students.

Activity Objectives

Activity objectives are enabling or performance objectives that relate to the specific activity. Such objectives appear at both the beginning and the end of each activity. They identify the actions to be taken and the behaviors to be acquired by students to insure their success in achieving the broader objectives of the curriculum.

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The role of the activity objective is to provide the teacher with specific instructional landmarks both to plot the course and to chart student progress. The objectives include information which the student has repeated or restated, experiences he has had, actions he has performed, and products he has made. Particular note should be paid to the minimum objectives as stated at the conclusion of the activity. The successful accomplishment of the succeeding activities is largely dependent on each student meeting these stated minimums. Some care should, therefore, be taken in making sure that the minimums are met before moving on to the next activity.

Anticipated Student Response Behaviors

Within an activity the anticipated behaviors are all the actions or interactions occurring during instruction. As listed for each activity, they describe what we predict students will do or say in response to some specific strategy.

TEACHING THE MATERIALS

It is often said that man is a curious animal and that the process and knowledge of science is a vehicle to capitalize on this phenomenon.

Science, then, for the EMH student, capitalizes on the student's natural curiosity about himself. Science is exciting, and ME AND MY ENVIRONMENT relies on this excitement. This science program has been designed to fit into the already existing curriculum framework and within modern teaching philosophies.

The amount of time spent on each activity can be tailored to fit the mood of the class and its teacher - that is, of you and your students. An average of 45 minutes may be required for all activities. Some activities will require extensive time, perhaps several days. The main point in teaching ME AND MY ENVIRONMENT is not to hurry - to allow sufficient time for inquiry to occur.

The ME AND MY ENVIRONMENT sequence may span three years, or it may take less time. Make all the allowances you need to for your students, in setting the pace from activity to activity.

Particular attention has been given to articulating the science curriculum with the other parts of the instructional program. Sight vocabulary is included in many of the activities, and suggestions given for using these words in spelling and vocabulary lessons. Math skills are an integral part of science, and the lessons provide application of the student's math skills.

Planning Guide

A planning guide is included in the introductory material to each core. Teaching the materials for the first time will require preparation time. Less time will be required after that. The teacher's planning guide will help you prepare materials in advance. For example, if a film is to be ordered, the planning guide will remind you when. The guide should be followed closely to initiate an activity.

Overviews

Each unit and core of ME AND MY ENVIRONMENT is provided with a beginning "roadmap" to give you as the teacher an insight into the direction or groupings of activities.

Rationale

Each unit and core is provided with a section to provide background into the *why* of the particular teaching content and physical materials used. These rationales should be read, thought about, and continually referred back to, in order for you to focus on and subsequently provide a consistent *why* philosophy in interractions with students.

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Background Information

Some pertinent points which are not necessarily developed in the curriculum itself, but which will provide you with useful information, have been incorporated in the Background Information section at the beginning of each core.

Clues To Success

A portion of the evaluation program during the field testing of ME AND MY ENVIRONMENT involved the use of objective questions and performance tasks. The items used were specifically designed to secure information about students' background knowledge as well as to secure data about the success of the materials. They were not intended as tests, nor were they used in that way to evaluate the youngsters.

Because the design of these items proved highly effective with this student population, many of the questions and situational tasks were incorporated into the second experimental edition. Further refinement was made, and it has resulted in the inclusion throughout this commercial edition of activities titled Clues To Success. These along with their tallysheets give you immediate feedback on the effectiveness of materials and instruction. At the point of use of each of these activities, you have the unique opportunity to determine whether or not your students are ready for the next activity or whether a modification, repetition, extension, or review of certain activities is necessary before proceeding.

Further discussion of the uses of the Clues To Success are included in the expendable section of this introduction entitled Student Record of Progress.

Worksheets

The worksheets in the program are used in a variety of ways: a) as reinforcement to general or specific objectives; b) to introduce new information and to record data; c) to enhance the interest in an activity; d) as a culminating activity to review what has been covered in previous lessons. Difficult worksheets are duplicated on daylight slides (which may be projected on the chalkboard and written on there, during discussions). Worksheets may be introduced on the chalkboard before they are attempted by the individual students.

35 mm Slides

A colorful visual medium broadens instructional opportunities, especially during inquiry activities. The projected images of the slides should be used both by you and by most students during instruction. The teaching strategies give specific instructions.

Some of the slides, as noted, are duplications of various worksheets. They are specially processed for daylight projection: you need not completely darken your classroom. Students should be able to write or read at their desks or move from their desks to the chalkboard to write directly on the image with chalk while a slide is being shown. You should, however, turn off any lights or shade any windows whose light is reflected directly from the chalkboard. For adequate projection, use a 500-watt bulb.

For other slides, which are photographic scenes and for which there is no necessity to write on the projected image darken your classroom. These slides should be projected on a regular screen.

The largest possible image is usually best for the students to see clearly. Therefore, place the slide projector as far as possible from the chalkboard or screen, but not so far that the image projected extends above or below the edges of the board or screen.

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Be sure that you are familiar with the operating instructions for the Carousel Projector and that you observe the manufacturer's cautions for insertion and projection of slides, trays, bulbs, and lenses.

Filmstrips

For activities in which an entire series of slides will be used to promote one objective, a filmstrip has been made. If a Kodak Carousel* or Ektagraphic projector is the type to be used for the projection of the slides, we recommend the purchase of the Kodak Ektagraphic Filmstrip Adapter. It is inexpensive and will preclude the use of a second projector.

Games

Perhaps the most ambitious of the endeavors has been to promote certain objectives through the use of games and game theory. Besides providing variation to the instructional mode, the games are used to dramatize some of the major concepts in the curriculum, as well as to give experience in cooperation and taking turns.

Booklets

This medium is used as a variation to the worksheets and 35 mm slides. It combines a minimum of reading with cartooned illustrations to present somewhat detailed factual information.

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*Except the Kodak Carousel Sand S and S-AV projectors. The optional systems are not compatible.

Posters

When something is referred to often enough, it is sometimes advisable to present it in a large format. In these instances a 24" X 36" poster has been developed for convenient posting and frequent inspection.

Study Cards

Thirty-two photographic study cards have been prepared to provide further variation in the mode of presentation. They are designed for use with specific activities and to form the nucleus for a collection of photographs for bulletin board displays.

Polaroid Camera

To increase the opportunities for involving all students in the activities, a Polaroid camera is suggested as an optional part of the instructional materials. An activity designed to introduce your students to this camera is included as the first Change Of Pacer in the back of this *Teacher's Manual*. The camera was provided through the courtesy of the Polaroid Corporation during the field testing, but it cannot be supplied on this basis in quantity.

In most instances, in the field tests, the camera in the classroom served as a valuable motivational device for the students, as well as a help in prolonging their ever-so-short interest spans. Because of these successes, a Polaroid camera is strongly recommended. It has not been included as an integral portion of the basic kit, because of the potential cost of film and flashcubes.

Camera Log Book

An excellent means of recording and preserving class activities and student experiences is through the development of a class log

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book. To keep a log book, either make or purchase a photo album. Students may share the responsibility of collecting and mounting snapshots, titling each cluster of pictures, and writing a descriptive sentence or short poem to recollect what occurred in a particular picture.

The log book helps to build student ego and class morale. Students can browse through it periodically to recall what they looked like and what they accomplished alone and with other students in previous months. The teacher may use it as a change of pacer to help students recall and review specific concepts and activities, and to provide practice in written and verbal communication skills.

Change Of Pacers

At the back of this *Teacher's Manual* you will find the section called Change Of Pacers. There, numerous examples and suggestions are offered for those days when it is difficult to adhere to your regular schedule. These probably include days just prior to or immediately following a vacation, other days during the occurrence of severe snow storms or cold weather, and periods of high absenteeism due to epidemics, assembly programs, and so forth. So that these days will not be wasted, we have suggested a variety of enrichments, reviews, or extensions that complement and add to this curriculum. Use these activities, then, as the name implies, to provide those refreshing breathers to give your program the added zip that is necessary to offset those occurrences in scheduling over which you have no control.

Student Folders

A set of decals has been included with your *Teacher's Manual*. These are to be placed on the cover of a three ring binder or folder in which your students will keep their worksheets as they are completed. Reference is often made to worksheets already completed, and they are necessary at various points in the program. The folder provides you and the students with an efficient and convenient mechanism for maintaining their own files of science activities.

Team Size And Science Materials

The quantities of materials provided in the kit are based on a class size of sixteen students, or four teams of four each, or eight teams of two each. In the case of smaller numbers of students, you may find it advantageous to reduce the number of students working in a team. Likewise, in cases of larger numbers of students, the teams should be enlarged, or additional materials ordered.

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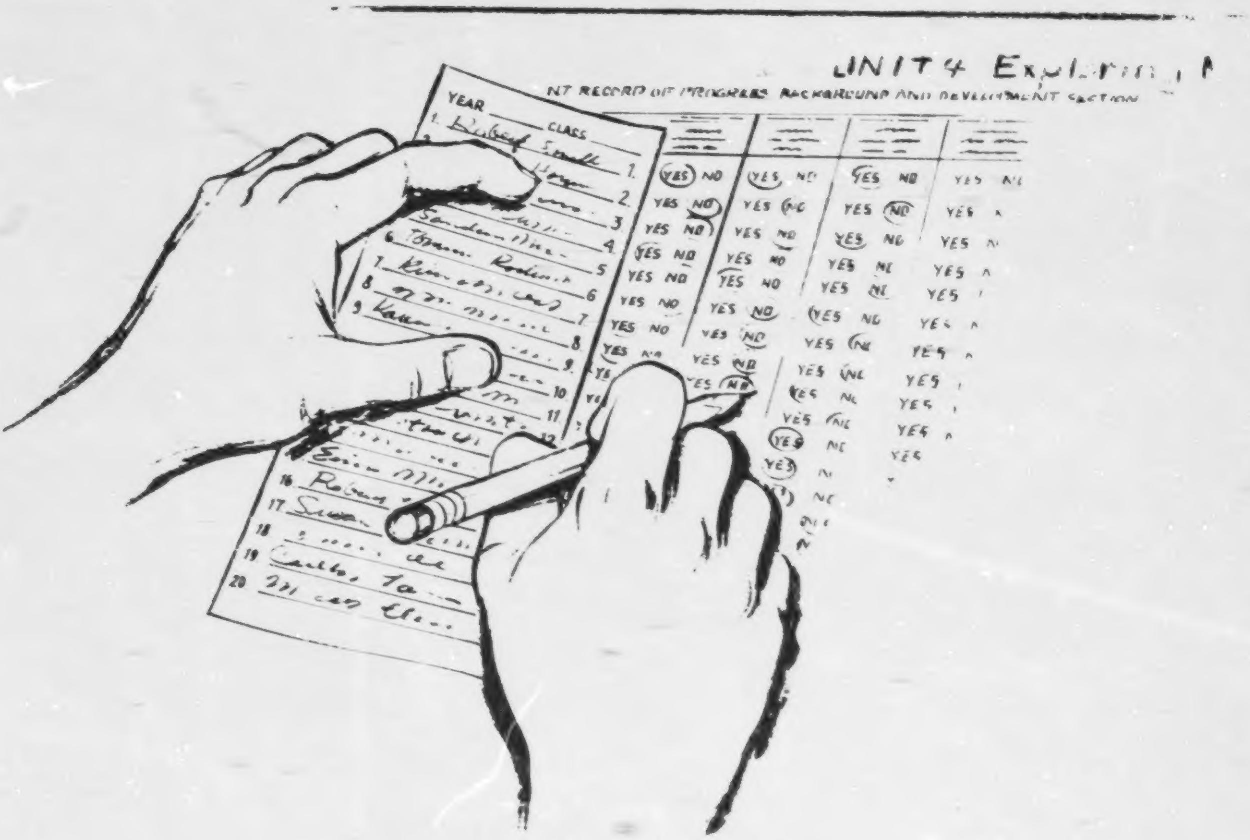
DIRECTIONS FOR

DIRECTIONS FOR USING THE STUDENT RECORD OF PROGRESS


UNIT 4 Exploring
NT RECORD OF PROGRESS BACKGROUND AND DEVELOPMENT SECTION
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Me and my
Environment

UNIT IV
STUDENT RECORD OF PROGRESS
INTRODUCTION

USES OF RECORD

Throughout each unit of ME AND MY ENVIRONMENT are Clues to Success activities which provide immediate feedback on the effectiveness of the materials and instruction. The Student Record of Progress helps you organize this information. This record will allow you to judge the effectiveness of instruction for your class at many points in the curriculum. It will also allow you to monitor the individual progress of students and set different standards of success for different children.

The Clues to Success activities and this Record are not intended for use as a grading system. Use it to make decisions, repeat or extend instruction, or to decide when to move on to the next activity. Use it to decide how to divide the class into teams for specific activities, and to assure the success of every student.

The two most important functions of the Student Record of Progress are:

1. To assess background and understanding: It rejects the notion that a single measure, like an IQ test, can tell what a child is able to do for all time. Instead, it enables the teacher to identify the level of skills and understandings related to each core of activities.

2. To assure success: It rejects the idea of sorting children into those who know or can do and those who can't. Instead, it provides a way for the teacher to direct his or her efforts toward the students needing greatest support in specific skills or concepts, so those students can achieve success.

The Student Record of Progress contains five main sections: Background and Development, Understanding, Participation, Summary of Progress, and Tallysheets for the Clues to Success activities.

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UNIT IV
STUDENT RECORD OF PROGRESS
INTRODUCTION

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BACKGROUND AND DEVELOPMENT SECTION

A child's success on each core of activities is dependent on his background of experiences with those particular concepts. Some basic skills are also central to success with these materials, especially problem-solving skills, the ability to recognize what the question is and what might lead to an answer. Following directions, working with one's hands, and categorizing are also important skills. You will find that some students will be weak in some areas but quite good in others. As the materials demand specific skills, assessments are provided to identify students who are low in these areas and will need extra attention and support to achieve success. This section provides a means of recording these assessments to develop a profile for each student.

The assessments of Background can be thought of as pretests measuring where your students are when instruction in certain areas is introduced. The results will suggest what responses are reasonable to expect when you teach the materials. If a student who is less able in those skills is teamed with a more able student, he might be more successful and less frustrated in doing the activities.

No student is uniformly low (or high) in all skills and experiences. Some go through spurts of development. Background assessments help avoid prejudging children. They serve to correct underestimates and overestimates of initial competencies and experience. Assessments of the most important background and developmental skills are periodically interspersed throughout the materials. The Overview page following this introduction indicates which skills are assessed at various points in the year.

Progress in Following Directions is the first record page in the Background and Development Section. Ability to follow directions is essential for maximum success on activities and for building a personal sense of competence in and control over one's environment. Identify those students in need of special help and follow their progress.

BACKGROUND AND DEVELOPMENT SECTION (continued)

At three points in Unit IV you are asked to rate your students' ability to follow directions. Clues to Success activities at these points provide an objective measure of students' abilities. Combining these two sources of information should reveal which students need closest supervision and support in order to achieve success.

Development of Experience is the second record page in the Background and Development Section. This page allows you to follow each student's progress in observing and recording. These skills develop through repeated experience and are not learned through a single activity. Therefore, this section should be used to identify the experience level at which each student is operating rather than to grade students. Those students who are rated poor in observation skills and who can not record observed data will need to be provided with many opportunities to observe and record.

UNDERSTANDING SECTION

A sense of progress and achievement is something students need help to realize. This record is one way you can show students they are learning. A log of student performance also lets you see the progress of the class as well as of individual students. To help identify strengths and weaknesses of groups in the class, tallysheets are included for some Clues to Success activities. These tallysheets can be found at the end of the Student Record of Progress.

Several aspects of accountability are provided by this section. First, and most important, the teacher has an accounting of his or her own effectiveness in instruction. Over a period of time there should be fewer students who are unsuccessful. Should many in the class show a consistent lack of success, it may be that these materials are inappropriate for that particular group of students. This log of student performance can also provide evidence of learning and progress to parents and the school.

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Finally, the Summary of Progress Section may reveal students who are inappropriately placed. It certainly should provide additional information to consider in any review of the placement of students in special education classes.

PARTICIPATION

The four major aims of ME AND MY ENVIRONMENT involve far more than the learning of specific information and skills. They include the development of a sense of self-worth, successful behaviors for daily life, attitudes, relationships with others, and the ability to assume various responsibilities. This section of the Student Record of Progress provides a means of following and encouraging the development of some of these behaviors.

Responsibility and Involvement is the first record page in this section. Students need many opportunities to assume responsibility and to carry things out on their own. Of course this is tremendously important in every day experiences. Use this page as a planning guide to see that each child gets the chance to do such things as care for plants and animals, set up and operate audio-visual equipment, distribute and clean up science equipment, prepare bulletin boards, etc. Use this section also to note students who have difficulty following through on responsibilities. Plan additional opportunities for these children (not as penalties) and provide the support needed for them to successfully accomplish their task.

Sometimes students' attitudes and involvement shift during the year. You may not be conscious of the shift without purposely reviewing students' actions. As a major aim of the curriculum is to develop certain attitudes and interests, it is useful to consider this dimension several times during the year. To assist you in this review, the page provides space to record ratings of student attitudes and participation.

Cooperation and Perserverance is the second page of this section. Closely related to the assumption of responsibilities and involvement

PARTICIPATION (continued)

in activities is the day-to-day participation of students. Sometime personal behavior problems prevent success or interfere with the work of the class. A page in the Accomplishments Section is provided to record cooperative social behavior and completion of daily work in science. Students often need help to recognize problems which interfere with their learning. It is sometimes effective to have students who are encountering difficulties assist in rating their own daily performance.

Students also need recognition and praise for showing initiative, perserverance, or extra effort. This record may be used to identify those students who have put forth extra effort or have been involved in activities. Such behavior should be reinforced by the teacher.

SUMMARY OF PROGRESS

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TALLYSHEET SECTION

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USE OF CLASS LIST

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UNIT IV
STUDENT RECORD OF PROGRESS
INTRODUCTION (continued)

BSCS

SUMMARY OF PROGRESS

In order to obtain a comprehensive view of each child's progress, a system has been developed for comparing results from one point in time to another and across all of the records of skills and understandings. Steps to apply this system are described in the last activity in the unit.

TALLYSHEET SECTION

When reference is made in a Clues to Success activity to the use of a tallysheet, find the appropriate one in the last section of the Student Record of Progress. The tallysheets contain guidelines for scoring and interpreting student work. They organize the results in a convenient way for revealing strengths and weaknesses in understanding for the class as a group. They also simplify recording results in the Student Record of Progress

USE OF CLASS LIST

On page 24 you will find a Class List card for use in making entries in the Student Record of Progress. This card eliminates the need to list your student's names more than once.

STUDENT RECORD OF PROGRESS
UNIT IV OVERVIEW

	Pages of Record Where Results Are Recorded	Background, Understandings, and Participation Sampled	CORE A Act. 4-0 - 4-7	Act. 4-8
BACKGROUND AND DEVELOPMENT SECTION	Progress in Following Directions	Following Directions	4-7	
	Development of Experience	Observation Recording		4-10 4-10
UNDERSTANDING SECTION	Concepts	Concepts	4-1 4-2 4-7	
	Problem Solving	Outcomes (Results and Implications)	4-7	
PARTICIPATION SECTION	Responsibility and Involvement	Involvement Responsibilities	4-7 Weekly Record	
	Cooperation and Perseverance	Social Behavior Task Behavior	Record For Each Activity Record For Each Activity	

STUDENT RECORD OF PROGRESS
UNIT IV OVERVIEW

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sibilities	Weekly Record		
Behavior	Record For Each Activity		
ehavior	Record For Each Activity		

UNIT IV
STUDENT RECORD OF PROGRESS
BACKGROUND AND DEVELOPMENT SECTION
PROGRESS IN FOLLOWING DIRECTIONS

Teacher Rating:

Prior to each activity assessing the ability to follow directions, rate each child's ability to follow directions by circling a number from 0 to 5. The higher the number circled, the more able you believe the child is to carry out a task or sequence of activities with little supervision.

Activity Scores:

Follow the guidelines in the Clues to Success Activities 4-7, 4-19, and 4-27 to obtain a "following directions" score for each student. Combine your rating with this score to determine who needs help most. Provide close supervision and support to help these students be successful. Team them with more able students. Plan special opportunities for them to practice following directions.

STUDENT NUMBER	TCHR. RATING START OF ACT. 4-7 LOW HIGH	ACT. 4-7 SCORE YES PART NO	WHO NEEDS HELP MOST?	TCHR. RATING START OF ACT. 4-19 LOW HIGH	ACT. 4-19 SCORE YES PART NO
1.	0 1 2 3 4 5	YES PART NO		0 1 2 3 4 5	YES PART NO
2.	0 1 2 3 4 5	YES PART NO		0 1 2 3 4 5	YES PART NO
3.	0 1 2 3 4 5	YES PART NO		0 1 2 3 4 5	YES PART NO
4.	0 1 2 3 4 5	YES PART NO		0 1 2 3 4 5	YES PART NO
5.	0 1 2 3 4 5	YES PART NO		0 1 2 3 4 5	YES PART NO
6.	0 1 2 3 4 5	YES PART NO		0 1 2 3 4 5	YES PART NO
7.	0 1 2 3 4 5	YES PART NO		0 1 2 3 4 5	YES PART NO
8.	0 1 2 3 4 5	YES PART NO		0 1 2 3 4 5	YES PART NO
9.	0 1 2 3 4 5	YES PART NO		0 1 2 3 4 5	YES PART NO
10.	0 1 2 3 4 5	YES PART NO		0 1 2 3 4 5	YES PART NO
11.	0 1 2 3 4 5	YES PART NO		0 1 2 3 4 5	YES PART NO
12.	0 1 2 3 4 5	YES PART NO		0 1 2 3 4 5	YES PART NO
13.	0 1 2 3 4 5	YES PART NO		0 1 2 3 4 5	YES PART NO
14.	0 1 2 3 4 5	YES PART NO		0 1 2 3 4 5	YES PART NO
15.	0 1 2 3 4 5	YES PART NO		0 1 2 3 4 5	YES PART NO
16.	0 1 2 3 4 5	YES PART NO		0 1 2 3 4 5	YES PART NO
17.	0 1 2 3 4 5	YES PART NO		0 1 2 3 4 5	YES PART NO
18.	0 1 2 3 4 5	YES PART NO		0 1 2 3 4 5	YES PART NO
19.	0 1 2 3 4 5	YES PART NO		0 1 2 3 4 5	YES PART NO
20.	0 1 2 3 4 5	YES PART NO		0 1 2 3 4 5	YES PART NO

UNIT IV
STUDENT RECORD OF PROGRESS
BACKGROUND AND DEVELOPMENT SECTION
PROGRESS IN FOLLOWING DIRECTIONS

Teacher________________________

Year________________________

G H	ACT. 4-7 SCORE YES PART NO	WHO NEEDS HELP MOST?	TCHR. RATING START OF ACT. 4-19 LOW HIGH	ACT. 4-19 SCORE YES PART NO	WHO NEEDS HELP MOST?	TCHR. RATING START OF ACT. 4-27 LOW HIGH	ACT. 4-27 SCORE YES PART NO	WHO NEEDS HELP MOST?	STUDENT PROGRESS IN UNIT IV HIGH GROWTH LOW
	YES PART NO		0 1 2 3 4 5	YES PART NO		0 1 2 3 4 5	YES PART NO		
	YES PART NO		0 1 2 3 4 5	YES PART NO		0 1 2 3 4 5	YES PART NO		
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UNIT IV
STUDENT RECORD OF PROGRESS
BACKGROUND AND DEVELOPMENT SECTION
DEVELOPMENT OF EXPERIENCE

	ACTIVITY 4-10		WHO NEEDS HELP		ACTIVITY 4-13	
STUDENT NUMBER	ABILITY TO OBSERVE	CAN RECORD RESULTS	O	R	ABILITY TO OBSERVE	CAN RECORD RESULTS
1.	GOOD FAIR POOR	YES HELP NO			GOOD FAIR POOR	YES HELP
2.	GOOD FAIR POOR	YES HELP NO			GOOD FAIR POOR	YES HELP
3.	GOOD FAIR POOR	YES HELP NO			GOOD FAIR POOR	YES HELP
4.	GOOD FAIR POOR	YES HELP NO			GOOD FAIR POOR	YES HELP
5.	GOOD FAIR POOR	YES HELP NO			GOOD FAIR POOR	YES HELP
6.	GOOD FAIR POOR	YES HELP NO			GOOD FAIR POOR	YES HELP
7.	GOOD FAIR POOR	YES HELP NO			GOOD FAIR POOR	YES HELP
8.	GOOD FAIR POOR	YES HELP NO			GOOD FAIR POOR	YES HELP
9.	GOOD FAIR POOR	YES HELP NO			GOOD FAIR POOR	YES HELP
10.	GOOD FAIR POOR	YES HELP NO			GOOD FAIR POOR	YES HELP
11.	GOOD FAIR POOR	YES HELP NO			GOOD FAIR POOR	YES HELP
12.	GOOD FAIR POOR	YES HELP NO			GOOD FAIR POOR	YES HELP
13.	GOOD FAIR POOR	YES HELP NO			GOOD FAIR POOR	YES HELP
14.	GOOD FAIR POOR	YES HELP NO			GOOD FAIR POOR	YES HELP
15.	GOOD FAIR POOR	YES HELP NO			GOOD FAIR POOR	YES HELP
16.	GOOD FAIR POOR	YES HELP NO			GOOD FAIR POOR	YES HELP
17.	GOOD FAIR POOR	YES HELP NO			GOOD FAIR POOR	YES HELP
18.	GOOD FAIR POOR	YES HELP NO			GOOD FAIR POOR	YES HELP
19.	GOOD FAIR POOR	YES HELP NO			GOOD FAIR POOR	YES HELP
20.	GOOD FAIR POOR	YES HELP NO			GOOD FAIR POOR	YES HELP

UNIT IV
STUDENT RECORD OF PROGRESS
BACKGROUND AND DEVELOPMENT SECTION
DEVELOPMENT OF EXPERIENCE

Teacher ____________________

Year ____________________

WHO NEEDS HELP		ACTIVITY 4-13		ACTIVITY 4-14		WHO NEEDS HELP	
O	R	ABILITY TO OBSERVE	CAN RECORD RESULTS	ABILITY TO OBSERVE	CAN RECORD RESULTS	O	R
______	______	GOOD FAIR POOR	YES HELP NO	GOOD FAIR POOR	YES HELP NO	______	______
______	______	GOOD FAIR POOR	YES HELP NO	GOOD FAIR POOR	YES HELP NO	______	______
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______	______	GOOD FAIR POOR	YES HELP NO	GOOD FAIR POOR	YES HELP NO	______	______
______	______	GOOD FAIR POOR	YES HELP NO	GOOD FAIR POOR	YES HELP NO	______	______

UNIT IV
STUDENT RECORD OF PROGRESS
UNDERSTANDING SECTION
CONCEPTS

This record reveals as much about your instruction as it does about your students' understanding of these concepts. If you note that the same students have difficulty grouping ideas throughout the unit, aim your instruction at them. This could result in all achieving success.

This record also provides an indication of retention of ideas over a longer period of time.

	ACT. 4-1	ACT. 4-2	ACT. 4-7		ACT	
STUDENT NUMBER	FOOD CHAINS	TRANSFER CONCEPT	TRANSFER OF ENERGY	CORE A CONCEPTS WHO IS:	CYCLE	LI MI
1.	YES NO	0 1 2 3 4 5	YES NO	HIGH LOW	YES NO	YE
2.	YES NO	0 1 2 3 4 5	YES NO	HIGH LOW	YES NO	YE
3.	YES NO	0 1 2 3 4 5	YES NO	HIGH LOW	YES NO	YE
4.	YES NO	0 1 2 3 4 5	YES NO	HIGH LOW	YES NO	YE
5.	YES NO	0 1 2 3 4 5	YES NO	HIGH LOW	YES NO	YE
6.	YES NO	0 1 2 3 4 5	YES NO	HIGH LOW	YES NO	YE
7.	YES NO	0 1 2 3 4 5	YES NO	HIGH LOW	YES NO	YE
8.	YES NO	0 1 2 3 4 5	YES NO	HIGH LOW	YES NO	YE
9.	YES NO	0 1 2 3 4 5	YES NO	HIGH LOW	YES NO	YE
10.	YES NO	0 1 2 3 4 5	YES NO	HIGH LOW	YES NO	YE
11.	YES NO	0 1 2 3 4 5	YES NO	HIGH LOW	YES NO	YE
12.	YES NO	0 1 2 3 4 5	YES NO	HIGH LOW	YES NO	YE
13.	YES NO	0 1 2 3 4 5	YES NO	HIGH LOW	YES NO	YE
14.	YES NO	0 1 2 3 4 5	YES NO	HIGH LOW	YES NO	YE
15.	YES NO	0 1 2 3 4 5	YES NO	HIGH LOW	YES NO	YE
16.	YES NO	0 1 2 3 4 5	YES NO	HIGH LOW	YES NO	YE
17.	YES NO	0 1 2 3 4 5	YES NO	HIGH LOW	YES NO	YE
18.	YES NO	0 1 2 3 4 5	YES NO	HIGH LOW	YES NO	YE
19.	YES NO	0 1 2 3 4 5	YES NO	HIGH LOW	YES NO	YE
20.	YES NO	0 1 2 3 4 5	YES NO	HIGH LOW	YES NO	YE

UNIT IV
STUDENT RECORD OF PROGRESS
UNDERSTANDING SECTION
CONCEPTS

Teacher____________________

Year____________________

ACT. 4-2	ACT. 4-7		ACTIVITY 4-19				ACTIVITY 4-27	
TRANSFER CONCEPT	TRANSFER OF ENERGY	CORE A CONCEPTS WHO IS:	CYCLE	LIVING MICROBES	HELPFUL MICROBES	CORE B CONCEPTS WHO IS:	BIODE-GRADABLE	GARBAGE PROBLEM
0 1 2 3 4 5	YES NO	HIGH LOW	YES NO	YES NO	YES NO	HIGH LOW	YES NO	HIGH SOME LOW
0 1 2 3 4 5	YES NO	HIGH LOW	YES NO	YES NO	YES NO	HIGH LOW	YES NO	HIGH SOME LOW
0 1 2 3 4 5	YES NO	HIGH LOW	YES NO	YES NO	YES NO	HIGH LOW	YES NO	HIGH SOME LOW
0 1 2 3 4 5	YES NO	HIGH LOW	YES NO	YES NO	YES NO	HIGH LOW	YES NO	HIGH SOME LOW
0 1 2 3 4 5	YES NO	HIGH LOW	YES NO	YES NO	YES NO	HIGH LOW	YES NO	HIGH SOME LOW
0 1 2 3 4 5	YES NO	HIGH LOW	YES NO	YES NO	YES NO	HIGH LOW	YES NO	HIGH SOME LOW
0 1 2 3 4 5	YES NO	HIGH LOW	YES NO	YES NO	YES NO	HIGH LOW	YES NO	HIGH SOME LOW
0 1 2 3 4 5	YES NO	HIGH LOW	YES NO	YES NO	YES NO	HIGH LOW	YES NO	HIGH SOME LOW
0 1 2 3 4 5	YES NO	HIGH LOW	YES NO	YES NO	YES NO	HIGH LOW	YES NO	HIGH SOME LOW
0 1 2 3 4 5	YES NO	HIGH LOW	YES NO	YES NO	YES NO	HIGH LOW	YES NO	HIGH SOME LOW
0 1 2 3 4 5	YES NO	HIGH LOW	YES NO	YES NO	YES NO	HIGH LOW	YES NO	HIGH SOME LOW
0 1 2 3 4 5	YES NO	HIGH LOW	YES NO	YES NO	YES NO	HIGH LOW	YES NO	HIGH SOME LOW
0 1 2 3 4 5	YES NO	HIGH LOW	YES NO	YES NO	YES NO	HIGH LOW	YES NO	HIGH SOME LOW
0 1 2 3 4 5	YES NO	HIGH LOW	YES NO	YES NO	YES NO	HIGH LOW	YES NO	HIGH SOME LOW
0 1 2 3 4 5	YES NO	HIGH LOW	YES NO	YES NO	YES NO	HIGH LOW	YES NO	HIGH SOME LOW
0 1 2 3 4 5	YES NO	HIGH LOW	YES NO	YES NO	YES NO	HIGH LOW	YES NO	HIGH SOME LOW
0 1 2 3 4 5	YES NO	HIGH LOW	YES NO	YES NO	YES NO	HIGH LOW	YES NO	HIGH SOME LOW
0 1 2 3 4 5	YES NO	HIGH LOW	YES NO	YES NO	YES NO	HIGH LOW	YES NO	HIGH SOME LOW
0 1 2 3 4 5	YES NO	HIGH LOW	YES NO	YES NO	YES NO	HIGH LOW	YES NO	HIGH SOME LOW
0 1 2 3 4 5	YES NO	HIGH LOW	YES NO	YES NO	YES NO	HIGH LOW	YES NO	HIGH SOME LOW

UNIT IV
STUDENT RECORD OF PROGRESS
UNDERSTANDING SECTION
CONCEPTS (continued)

STUDENT NUMBER	ACTIVITY 4-27					ACTIVITY 4-28 CONCEPT		
	MICROBES	RECYCLING	CORE C CONCEPTS WHO IS:	COMPOST	FOODCHAINS	LONG JOURNEY	FOOD WEBS	INTER-DEPENDENCE
1.	YES NO	YES NO	HIGH LOW	HIGH SOME LOW	HIGH SOME LOW	YES NO	YES NO	YES NO
2.	YES NO	YES NO	HIGH LOW	HIGH SOME LOW	HIGH SOME LOW	YES NO	YES NO	YES NO
3.	YES NO	YES NO	HIGH LOW	HIGH SOME LOW	HIGH SOME LOW	YES NO	YES NO	YES NO
4.	YES NO	YES NO	HIGH LOW	HIGH SOME LOW	HIGH SOME LOW	YES NO	YES NO	YES NO
5.	YES NO	YES NO	HIGH LOW	HIGH SOME LOW	HIGH SOME LOW	YES NO	YES NO	YES NO
6.	YES NO	YES NO	HIGH LOW	HIGH SOME LOW	HIGH SOME LOW	YES NO	YES NO	YES NO
7.	YES NO	YES NO	HIGH LOW	HIGH SOME LOW	HIGH SOME LOW	YES NO	YES NO	YES NO
8.	YES NO	YES NO	HIGH LOW	HIGH SOME LOW	HIGH SOME LOW	YES NO	YES NO	YES NO
9.	YES NO	YES NO	HIGH LOW	HIGH SOME LOW	HIGH SOME LOW	YES NO	YES NO	YES NO
10.	YES NO	YES NO	HIGH LOW	HIGH SOME LOW	HIGH SOME LOW	YES NO	YES NO	YES NO
11.	YES NO	YES NO	HIGH LOW	HIGH SOME LOW	HIGH SOME LOW	YES NO	YES NO	YES NO
12.	YES NO	YES NO	HIGH LOW	HIGH SOME LOW	HIGH SOME LOW	YES NO	YES NO	YES NO
13.	YES NO	YES NO	HIGH LOW	HIGH SOME LOW	HIGH SOME LOW	YES NO	YES NO	YES NO
14.	YES NO	YES NO	HIGH LOW	HIGH SOME LOW	HIGH SOME LOW	YES NO	YES NO	YES NO
15.	YES NO	YES NO	HIGH LOW	HIGH SOME LOW	HIGH SOME LOW	YES NO	YES NO	YES NO
16.	YES NO	YES NO	HIGH LOW	HIGH SOME LOW	HIGH SOME LOW	YES NO	YES NO	YES NO
17.	YES NO	YES NO	HIGH LOW	HIGH SOME LOW	HIGH SOME LOW	YES NO	YES NO	YES NO
18.	YES NO	YES NO	HIGH LOW	HIGH SOME LOW	HIGH SOME LOW	YES NO	YES NO	YES NO
19.	YES NO	YES NO	HIGH LOW	HIGH SOME LOW	HIGH SOME LOW	YES NO	YES NO	YES NO
20.	YES NO	YES NO	HIGH LOW	HIGH SOME LOW	HIGH SOME LOW	YES NO	YES NO	YES NO

UNIT IV
STUDENT RECORD OF PROGRESS
UNDERSTANDING SECTION
CONCEPTS (continued)

Teacher________________________

Year___________________________

ACTIVITY 4-28 CONCEPT REVIEW QUESTIONS									
	FOODCHAINS	LONG JOURNEY	FOOD WEBS	INTER-DEPENDENCE	DECOMPOSERS	PLANTING IN COMPOST	THINGS THAT BREATHE	DECOMPOSING CONDITIONS	BAKING BREAD
OW	HIGH SOME LOW	YES NO	YES NO	YES NO	YES NO	HIGH SOME LOW	YES NO	YES NO	YES NO
OW	HIGH SOME LOW	YES NO	YES NO	YES NO	YES NO	HIGH SOME LOW	YES NO	YES NO	YES NO
OW	HIGH SOME LOW	YES NO	YES NO	YES NO	YES NO	HIGH SOME LOW	YES NO	YES NO	YES NO
OW	HIGH SOME LOW	YES NO	YES NO	YES NO	YES NO	HIGH SOME LOW	YES NO	YES NO	YES NO
OW	HIGH SOME LOW	YES NO	YES NO	YES NO	YES NO	HIGH SOME LOW	YES NO	YES NO	YES NO
OW	HIGH SOME LOW	YES NO	YES NO	YES NO	YES NO	HIGH SOME LOW	YES NO	YES NO	YES NO
OW	HIGH SOME LOW	YES NO	YES NO	YES NO	YES NO	HIGH SOME LOW	YES NO	YES NO	YES NO
OW	HIGH SOME LOW	YES NO	YES NO	YES NO	YES NO	HIGH SOME LOW	YES NO	YES NO	YES NO
OW	HIGH SOME LOW	YES NO	YES NO	YES NO	YES NO	HIGH SOME LOW	YES NO	YES NO	YES NO
OW	HIGH SOME LOW	YES NO	YES NO	YES NO	YES NO	HIGH SOME LOW	YES NO	YES NO	YES NO
OW	HIGH SOME LOW	YES NO	YES NO	YES NO	YES NO	HIGH SOME LOW	YES NO	YES NO	YES NO
OW	HIGH SOME LOW	YES NO	YES NO	YES NO	YES NO	HIGH SOME LOW	YES NO	YES NO	YES NO
OW	HIGH SOME LOW	YES NO	YES NO	YES NO	YES NO	HIGH SOME LOW	YES NO	YES NO	YES NO
OW	HIGH SOME LOW	YES NO	YES NO	YES NO	YES NO	HIGH SOME LOW	YES NO	YES NO	YES NO
OW	HIGH SOME LOW	YES NO	YES NO	YES NO	YES NO	HIGH SOME LOW	YES NO	YES NO	YES NO
OW	HIGH SOME LOW	YES NO	YES NO	YES NO	YES NO	HIGH SOME LOW	YES NO	YES NO	YES NO
OW	HIGH SOME LOW	YES NO	YES NO	YES NO	YES NO	HIGH SOME LOW	YES NO	YES NO	YES NO
OW	HIGH SOME LOW	YES NO	YES NO	YES NO	YES NO	HIGH SOME LOW	YES NO	YES NO	YES NO
OW	HIGH SOME LOW	YES NO	YES NO	YES NO	YES NO	HIGH SOME LOW	YES NO	YES NO	YES NO
OW	HIGH SOME LOW	YES NO	YES NO	YES NO	YES NO	HIGH SOME LOW	YES NO	YES NO	YES NO

UNIT IV
STUDENT RECORD OF PROGRESS
UNDERSTANDING SECTION
CONCEPTS (continued)

STUDENT NUMBER	ACTIVITY 4-28 CONCEPT REVIEW QUESTIONS											
	Food Cycle		Garbage		Decompose		Recycling		Less Garbage		Recycling Payoff Game	
1.	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO
2.	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO
3.	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO
4.	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO
5.	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO
6.	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO
7.	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO
8.	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO
9.	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO
10.	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO
11.	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO
12.	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO
13.	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO
14.	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO
15.	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO
16.	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO
17.	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO
18.	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO
19.	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO
20.	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO

UNIT IV
STUDENT RECORD OF PROGRESS
UNDERSTANDING SECTION
CONCEPTS (continued)

Teacher______________________

Year______________________

VITY 4-28 CONCEPT REVIEW QUESTIONS				STUDENT PROGRESS IN UNIT IV			
Decompose	Recycling	Less Garbage	Recycling Payoff Game	HIGH	GROWTH	LOSS	LOW
YES NO	YES NO	YES NO	YES NO	___	___	___	___
YES NO	YES NO	YES NO	YES NO	___	___	___	___
YES NO	YES NO	YES NO	YES NO	___	___	___	___
YES NO	YES NO	YES NO	YES NO	___	___	___	___
YES NO	YES NO	YES NO	YES NO	___	___	___	___
YES NO	YES NO	YES NO	YES NO	___	___	___	___
YES NO	YES NO	YES NO	YES NO	___	___	___	___
YES NO	YES NO	YES NO	YES NO	___	___	___	___
YES NO	YES NO	YES NO	YES NO	___	___	___	___
YES NO	YES NO	YES NO	YES NO	___	___	___	___
YES NO	YES NO	YES NO	YES NO	___	___	___	___
YES NO	YES NO	YES NO	YES NO	___	___	___	___
YES NO	YES NO	YES NO	YES NO	___	___	___	___
YES NO	YES NO	YES NO	YES NO	___	___	___	___
YES NO	YES NO	YES NO	YES NO	___	___	___	___
YES NO	YES NO	YES NO	YES NO	___	___	___	___
YES NO	YES NO	YES NO	YES NO	___	___	___	___
YES NO	YES NO	YES NO	YES NO	___	___	___	___
YES NO	YES NO	YES NO	YES NO	___	___	___	___
YES NO	YES NO	YES NO	YES NO	___	___	___	___

UNIT IV
STUDENT RECORD OF PROGRESS
UNDERSTANDING SECTION
PROBLEM SOLVING

This page of the Student Record of Progress provides the opportunity to record information regarding a student's ability to engage in problem-solving behaviors. Problem solving, like reasoning, is one of the higher inquiry skills which requires both time and a variety of experience to develop.

The activities upon which this page is based require the student to be able to predict outcomes. This is a difficult task.

Many students will not have been expected to engage in problem solving in the past. Therefore, their limited background will, likewise, limit their present performance.

As with each of the other skills and abilities which you are attempting to develop, the development of problem solving will require giving students many experiences with manipulating experiments and data.

STUDENT NUMBER	ACT. 4-7 Effects On Food Webs	ACT. 4-16 Food Storage
1.	YES NO	YES NO
2.	YES NO	YES NO
3.	YES NO	YES NO
4.	YES NO	YES NO
5.	YES NO	YES NO
6.	YES NO	YES NO
7.	YES NO	YES NO
8.	YES NO	YES NO
9.	YES NO	YES NO
10.	YES NO	YES NO
11.	YES NO	YES NO
12.	YES NO	YES NO
13.	YES NO	YES NO
14.	YES NO	YES NO
15.	YES NO	YES NO
16.	YES NO	YES NO
17.	YES NO	YES NO
18.	YES NO	YES NO
19.	YES NO	YES NO
20.	YES NO	YES NO

UNIT IV
STUDENT RECORD OF PROGRESS
UNDERSTANDING SECTION
PROBLEM SOLVING

Teacher ______________________________

Year ______________________________

STUDENT NUMBER	ACT. 4-7 Effects On Food Webs	ACT. 4-16 Food Storage	NOTES
1.	YES NO	YES NO	
2.	YES NO	YES NO	
3.	YES NO	YES NO	
4.	YES NO	YES NO	
5.	YES NO	YES NO	
6.	YES NO	YES NO	
7.	YES NO	YES NO	
8.	YES NO	YES NO	
9.	YES NO	YES NO	
10.	YES NO	YES NO	
11.	YES NO	YES NO	
12.	YES NO	YES NO	
13.	YES NO	YES NO	
14.	YES NO	YES NO	
15.	YES NO	YES NO	
16.	YES NO	YES NO	
17.	YES NO	YES NO	
18.	YES NO	YES NO	
19.	YES NO	YES NO	
20.	YES NO	YES NO	

STUDENT RECORD OF PROGRE
PARTICIPATION SECTION
RESPONSIBILITY AND INVOLVE

ASSIGNMENT OF RESPONSIBILITIES

Many tasks should be shared by students. Use this log to assign responsibilities by the week (or other time period). Some tasks and codes for them are listed; add others of your own:

AV--set up and operate audio-visual equipment (projector, recorder, etc.)
P --care for plants
A --care for animal pet
T --care for terraria plants and animals
F --care for fish and pond
E --get out, clean, and put away science equipment
BB--prepare bulletin board
--______________________________
--______________________________
--______________________________

Enough space is provided to enter a date for a second chance to do various tasks as time permits. There is also enough space to record whether the student completed the task:

O = on his own without reminders or assistance
R = on his own after reminding
H = with someone's help

RATING OF INVOLVEMENT

At three points in the course of Unit IV, rate each student's involvement and interest in science activities by circling a number from 0 to 5 in the appropriate column. Rate students 0 if they are completely uninterested or apathetic; rate them 5 if they are extremely excited and involved in doing things in science.

STUDENT NUMBER	TASK	AV	P	A
1.	DATE &			
	SUCCESS			
2.	DATE &			
	SUCCESS			
3.	DATE &			
	SUCCESS			
4.	DATE &			
	SUCCESS			
5.	DATE &			
	SUCCESS			
6.	DATE &			
	SUCCESS			
7.	DATE &			
	SUCCESS			
8.	DATE &			
	SUCCESS			
9.	DATE &			
	SUCCESS			
10.	DATE &			
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11.	DATE &			
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12.	DATE &			
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13.	DATE &			
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14.	DATE &			
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15.	DATE &			
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16.	DATE &			
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17.	DATE &			
	SUCCESS			
18.	DATE &			
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19.	DATE &			
	SUCCESS			
20.	DATE &			
	SUCCESS			

Teacher________________________
Year________________________

STUDENT RECORD OF PROGRESS
PARTICIPATION SECTION
RESPONSIBILITY AND INVOLVEMENT

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		ASSIGNMENT OF RESPONSIBILITIES											
STUDENT NUMBER	TASK	AV	P	A	T	F	E	BB	__	__	__	__	__
1.	DATE &												
	SUCCESS												
2.	DATE &												
	SUCCESS												
3.	DATE &												
	SUCCESS												
4.	DATE &												
	SUCCESS												
5.	DATE &												
	SUCCESS												
6.	DATE &												
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7.	DATE &												
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8.	DATE &												
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9.	DATE &												
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10.	DATE &												
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11.	DATE &												
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12.	DATE &												
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13.	DATE &												
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15.	DATE &												
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16.	DATE &												
	SUCCESS												
17.	DATE &												
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18.	DATE &												
	SUCCESS												
19.	DATE &												
	SUCCESS												
20.	DATE &												
	SUCCESS												

STUDENT RECORD OF PROGRESS
PARTICIPATION SECTION
RESPONSIBILITY AND INVOLVEMENT (continued)

		RATING OF INVOLVEMENT			STUDENT PROGRESS IN	
STUDENT NUMBER		AFTER ACT. 4-7	AFTER ACT. 4-19	AFTER ACT. 4-28	HIGH RESP. INVOLV.	ADEQUATE RESP. INVOLV.
1.	DATE & SUCCESS	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5		
2.	DATE & SUCCESS	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5		
3.	DATE & SUCCESS	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5		
4.	DATE & SUCCESS	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5		
5.	DATE & SUCCESS	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5		
6.	DATE & SUCCESS	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5		
7.	DATE & SUCCESS	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5		
8.	DATE & SUCCESS	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5		
9.	DATE & SUCCESS	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5		
10.	DATE & SUCCESS	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5		
11.	DATE & SUCCESS	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5		
12.	DATE & SUCCESS	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5		
13.	DATE & SUCCESS	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5		
14.	DATE & SUCCESS	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5		
15.	DATE & SUCCESS	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5		
16.	DATE & SUCCESS	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5		
17.	DATE & SUCCESS	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5		
18.	DATE & SUCCESS	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5		
19.	DATE & SUCCESS	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5		
20.	DATE & SUCCESS	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5		

Teacher ____________________

Year ____________________

STUDENT RECORD OF PROGRESS
PARTICIPATION SECTION
SPONSIBILITY AND INVOLVEMENT (continued)

RATING OF INVOLVEMENT		STUDENT PROGRESS IN UNIT IV		
AFTER ACT. 4-19	AFTER ACT. 4-28	HIGH RESP. INVOLV.	ADEQUATE RESP. INVOLV.	LOW RESP. INVOLV.
1 2 3 4 5	0 1 2 3 4 5			
1 2 3 4 5	0 1 2 3 4 5			
1 2 3 4 5	0 1 2 3 4 5			
1 2 3 4 5	0 1 2 3 4 5			
1 2 3 4 5	0 1 2 3 4 5			
1 2 3 4 5	0 1 2 3 4 5			
1 2 3 4 5	0 1 2 3 4 5			
1 2 3 4 5	0 1 2 3 4 5			
1 2 3 4 5	0 1 2 3 4 5			
1 2 3 4 5	0 1 2 3 4 5			
1 2 3 4 5	0 1 2 3 4 5			
1 2 3 4 5	0 1 2 3 4 5			
1 2 3 4 5	0 1 2 3 4 5			
1 2 3 4 5	0 1 2 3 4 5			
1 2 3 4 5	0 1 2 3 4 5			
1 2 3 4 5	0 1 2 3 4 5			
1 2 3 4 5	0 1 2 3 4 5			
1 2 3 4 5	0 1 2 3 4 5			
1 2 3 4 5	0 1 2 3 4 5			
1 2 3 4 5	0 1 2 3 4 5			

STUDENT RECORD OF PROGRESS
PARTICIPATION SECTION
COOPERATION AND PERSEVERANCE

A record sometimes helps clarify persistent learning problems. Sometimes students can gain in self-awareness by assisting in recording their own daily performance. In this way they become aware of the frequency with which problems occur.

To make an entry in the record, simply make a minus or plus mark (-, +) to indicate a problem or positive behavior. Much white space (lack of entries) for a student would denote generally good social and task-related behaviors.

Two columns under each activity allow you to record several types of behavior. For either category, you should decide on the items of behavior to include. If some of the behaviors below are appropriate, check them off, or write in your own.

S --Social behavior might include:
- ☐ non cooperation with a team
- ☐ aggressiveness toward others
- ☐ nonparticipation
- ☐ outbursts

T --Task-related behavior might include:
- ☐ not completing the work for an activity
- ☐ forgetting to bring necessary things
- ☐ not carrying out responsibilities
- ☐ doing things not related to the task

Compare this record with the students' success and functional abilities to see if any patterns are apparent. Remember that different relationships may exist for different students.

	ACTIVITIES							
STUDENT	1		2		3		4	
NUMBER	S	T	S	T	S	T	S	T
1.								
2.								
3.								
4.								
5.								
6.								
7.								
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14.								
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16.								
17.								
18.								
19.								
20.								

NOTES:

Teacher________________________
Year__________________________

STUDENT RECORD OF PROGRESS
PARTICIPATION SECTION
COOPERATION AND PERSEVERANCE

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STUDENT NUMBER	ACTIVITIES																									
	1		2		3		4		5		6		7		8		9		10		11		12		13	
	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T
1.																										
2.																										
3.																										
4.																										
5.																										
6.																										
7.																										
8.																										
9.																										
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12.																										
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17.																										
18.																										
19.																										
20.																										

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STUDENT RECORD OF
PARTICIPATION SE
COOPERATION AND PERSEVERAN

	ACTIVITIES																				
STUDENT NUMBER	14		15		16		17		18		19		20		21		22		23		24
	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S
1.																					
2.																					
3.																					
4.																					
5.																					
6.																					
7.																					
8.																					
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15.																					
16.																					
17.																					
18.																					
19.																					
20.																					

NOTES:

STUDENT RECORD OF PROGRESS
PARTICIPATION SECTION
COOPERATION AND PERSEVERANCE (continued)

	18		19		20		21		22		23		24		25		26		27		28	
T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T

STUDENT RECORD OF PROGRESS
SUMMARY OF STUDENT PROGRESS IN UNIT IV

From your summaries of each page, list the students with the LEAST Background, Understanding, and Accomplishments in Unit IV. For those whose names appear in many columns, make special plans to insure their future success.

LOW IN BACKGROUND AND DEVELOPMENT		LOW IN UNDERSTANDING	
Following Directions	Observing and Recording	Concepts	Problem Solving

NOTES:

From your summaries of each page, list the students with the MOST Background, Understanding, and Accomplishments in Unit IV. Review their work in other subjects and the appropriateness of their placement in this class.

HIGH IN BACKGROUND AND DEVELOPMENT		HIGH IN UNDERSTANDING	
Following Directions	Observing and Recording	Concepts	Problem Solving

STUDENT RECORD OF PROGRESS
SUMMARY OF STUDENT PROGRESS IN UNIT IV

Teacher________________________

Year___________________________

AND DEVELOPMENT	LOW IN UNDERSTANDING		LOW IN PARTICIPATION		Who Needs Help To Succeed In Unit V?
ng and Recording	Concepts	Problem Solving	Responsibility	Cooperation	

AND DEVELOPMENT	HIGH IN UNDERSTANDING		HIGH IN PARTICIPATION		Who Should Be Reviewed For Placement In Regular Class
g and Recording	Concepts	Problem Solving	Responsibility	Cooperation	

TALLYSHEET 4-1

ACTIVITY 4-1 (WORKSHEET 4-1) AND ACTIVITY 4-2 (WORKSHE

For each of the questions in Activities 4-1 and 4-2, circle YES if the student's answer is acceptable. Otherwise, circle NO.

	ACTIVITY 4-1			
	CONCEPTS PAGE			
	Hawk Chain	Man Chain	Lion Chain	
	1	2	3	
STUDENT NUMBER / KEY	Snake & Grass or Grain	Grass or Grain	Chicken & Insects or Worms	Cater
1.	YES NO	YES NO	YES NO	YES
2.	YES NO	YES NO	YES NO	YES
3.	YES NO	YES NO	YES NO	YES
4.	YES NO	YES NO	YES NO	YES
5.	YES NO	YES NO	YES NO	YES
6.	YES NO	YES NO	YES NO	YES
7.	YES NO	YES NO	YES NO	YES
8.	YES NO	YES NO	YES NO	YES
9.	YES NO	YES NO	YES NO	YES
10.	YES NO	YES NO	YES NO	YES
11.	YES NO	YES NO	YES NO	YES
12.	YES NO	YES NO	YES NO	YES
13.	YES NO	YES NO	YES NO	YES
14.	YES NO	YES NO	YES NO	YES
15.	YES NO	YES NO	YES NO	YES
16.	YES NO	YES NO	YES NO	YES
17.	YES NO	YES NO	YES NO	YES
18.	YES NO	YES NO	YES NO	YES
19.	YES NO	YES NO	YES NO	YES
20.	YES NO	YES NO	YES NO	YES
GROUP TOTALS	___ ___	___ ___	___ ___	___

Does this review give an accurate indication of student und

If not, what other evidence do you have of student learning

Teacher________________________________

TALLYSHEET 4-1

-1 (WORKSHEET 4-1) AND ACTIVITY 4-2 (WORKSHEET 4-2)

ACTIVITY 4-1	
CONCEPTS PAGE	
Man Chain	Lion Chain
2	3
Grass or Grain	Chicken & Insects or Worms
YES NO	YES NO
YES NO	YES NO
YES NO	YES NO
YES NO	YES NO
YES NO	YES NO
YES NO	YES NO
YES NO	YES NO
YES NO	YES NO
YES NO	YES NO
YES NO	YES NO
YES NO	YES NO
YES NO	YES NO
YES NO	YES NO
YES NO	YES NO
YES NO	YES NO
YES NO	YES NO
YES NO	YES NO
YES NO	YES NO
YES NO	YES NO
YES NO	YES NO
___ ___	___ ___

ACTIVITY 4-2				
CONCEPTS PAGE				
Food Chains				
1	2	3	4	5
Caterpillar	Fish	Mosquito & Fish	Arrows Correct	Food Chain
YES NO	YES NO	YES NO	YES NO	YES NO
YES NO	YES NO	YES NO	YES NO	YES NO
YES NO	YES NO	YES NO	YES NO	YES NO
YES NO	YES NO	YES NO	YES NO	YES NO
YES NO	YES NO	YES NO	YES NO	YES NO
YES NO	YES NO	YES NO	YES NO	YES NO
YES NO	YES NO	YES NO	YES NO	YES NO
YES NO	YES NO	YES NO	YES NO	YES NO
YES NO	YES NO	YES NO	YES NO	YES NO
YES NO	YES NO	YES NO	YES NO	YES NO
YES NO	YES NO	YES NO	YES NO	YES NO
YES NO	YES NO	YES NO	YES NO	YES NO
YES NO	YES NO	YES NO	YES NO	YES NO
YES NO	YES NO	YES NO	YES NO	YES NO
YES NO	YES NO	YES NO	YES NO	YES NO
YES NO	YES NO	YES NO	YES NO	YES NO
YES NO	YES NO	YES NO	YES NO	YES NO
YES NO	YES NO	YES NO	YES NO	YES NO
YES NO	YES NO	YES NO	YES NO	YES NO
YES NO	YES NO	YES NO	YES NO	YES NO
___ ___	___ ___	___ ___	___ ___	___ ___

w give an accurate indication of student understanding? ☐ YES ☐ NO

her evidence do you have of student learning?

TALLYSHEET 4-2
ACTIVITY 4-5

STUDENT TEAMS	ANIMALS																No. of animals found	
Team 1																		
Team 2																		
Team 3																		
Team 4																		
Team 5																		
Team 6																		
Team 7																		
Team 8																		
Team 9																		

Send this sheet in with the Activity 5 Feedback Form.

Teacher________________________________

TALLYSHEET 4-2
ACTIVITY 4-5

PLANTS

										No. of animals found																No. of plants found

back Form.

TALLYSHEET 4-3
ACTIVITY 4-7 (WORKSHEET 4-3)

Copy the rating and score for following directions which were recorded in the Student Record of Progress.

Question 1: Circle the word that each student marked.

Questions 2, 3, and 4: Circle the letter that each student marked.

	DIRECTIONS PAGE		CONCEPTS PAGE		
	Following Directions		Plants		
	Teacher Rating	Score	1		
KEY	0 1 2 3 4 5	YES PART NO	Plants	Man	Other
STUDENT NUMBER					
1.	0 1 2 3 4 5	YES PART NO	Plants	Man	Other
2.	0 1 2 3 4 5	YES PART NO	Plants	Man	Other
3.	0 1 2 3 4 5	YES PART NO	Plants	Man	Other
4.	0 1 2 3 4 5	YES PART NO	Plants	Man	Other
5.	0 1 2 3 4 5	YES PART NO	Plants	Man	Other
6.	0 1 2 3 4 5	YES PART NO	Plants	Man	Other
7.	0 1 2 3 4 5	YES PART NO	Plants	Man	Other
8.	0 1 2 3 4 5	YES PART NO	Plants	Man	Other
9.	0 1 2 3 4 5	YES PART NO	Plants	Man	Other
10.	0 1 2 3 4 5	YES PART NO	Plants	Man	Other
11.	0 1 2 3 4 5	YES PART NO	Plants	Man	Other
12.	0 1 2 3 4 5	YES PART NO	Plants	Man	Other
13.	0 1 2 3 4 5	YES PART NO	Plants	Man	Other
14.	0 1 2 3 4 5	YES PART NO	Plants	Man	Other
15.	0 1 2 3 4 5	YES PART NO	Plants	Man	Other
16.	0 1 2 3 4 5	YES PART NO	Plants	Man	Other
17.	0 1 2 3 4 5	YES PART NO	Plants	Man	Other
18.	0 1 2 3 4 5	YES PART NO	Plants	Man	Other
19.	0 1 2 3 4 5	YES PART NO	Plants	Man	Other
20.	0 1 2 3 4 5	YES PART NO	Plants	Man	Other

GROUP TOTALS _ _ _ _ _ _ _ _ _ _ _ _ _____ ___ _____

Does this review give an accurate indication of

If not, what other evidence do you have of studen

Teacher ____________________

TALLYSHEET 4-3
ACTIVITY 4-7 (WORKSHEET 4-3)

DIRECTIONS PAGE		CONCEPTS PAGE		PROBLEM SOLVING PAGE	
ollowing Directions		Plants	Food Web	Mosquitoes	Rabbit
er Rating	Score	1	2	3	4
2 3 4 5	YES PART NO	Plants Man Other	A B C D	A B C D	A B C D E
2 3 4 5	YES PART NO	Plants Man Other	A B C D	A B C D	A B C D E
2 3 4 5	YES PART NO	Plants Man Other	A B C D	A B C D	A B C D E
2 3 4 5	YES PART NO	Plants Man Other	A B C D	A B C D	A B C D E
3 4 5	YES PART NO	Plants Man Other	A B C D	A B C D	A B C D E
3 4 5	YES PART NO	Plants Man Other	A B C D	A B C D	A B C D E
3 4 5	YES PART NO	Plants Man Other	A B C D	A B C D	A B C D E
3 4 5	YES PART NO	Plants Man Other	A B C D	A B C D	A B C D E
3 4 5	YES PART NO	Plants Man Other	A B C D	A B C D	A B C D E
3 4 5	YES PART NO	Plants Man Other	A B C D	A B C D	A B C D E
3 4 5	YES PART NO	Plants Man Other	A B C D	A B C D	A B C D E
3 4 5	YES PART NO	Plants Man Other	A B C D	A B C D	A B C D E
3 4 5	YES PART NO	Plants Man Other	A B C D	A B C D	A B C D E
3 4 5	YES PART NO	Plants Man Other	A B C D	A B C D	A B C D E
3 4 5	YES PART NO	Plants Man Other	A B C D	A B C D	A B C D E
3 4 5	YES PART NO	Plants Man Other	A B C D	A B C D	A B C D E
3 4 5	YES PART NO	Plants Man Other	A B C D	A B C D	A B C D E
3 4 5	YES PART NO	Plants Man Other	A B C D	A B C D	A B C D E
3 4 5	YES PART NO	Plants Man Other	A B C D	A B C D	A B C D E
3 4 5	YES PART NO	Plants Man Other	A B C D	A B C D	A B C D E
3 4 5	YES PART NO	Plants Man Other	A B C D	A B C D	A B C D E
— — —	— — — — — —	____ ___ ____	— — — —	— — — —	— — — — —

this review give an accurate indication of student learning? ☐ YES ☐ NO

t, what other evidence do you have of student learning?

TALLYSHEET 4-4
ACTIVITY 4-16 (WORKSHEET 4-6)

For each question in Activity 4-16, circle the letter that each student marked.

	PROBLEM-SOLVING PAGE		
	Milk in Refrigerator	Wet and Warm	Unwrapped San
	1	2	3
KEY	A B C D	A B C D	A B C D
STUDENT NUMBER			
1.	A B C D	A B C D	A B C D
2.	A B C D	A B C D	A B C D
3.	A B C D	A B C D	A B C D
4.	A B C D	A B C D	A B C D
5.	A B C D	A B C D	A B C D
6.	A B C D	A B C D	A B C D
7.	A B C D	A B C D	A B C D
8.	A B C D	A B C D	A B C D
9.	A B C D	A B C D	A B C D
10.	A B C D	A B C D	A B C D
11.	A B C D	A B C D	A B C D
12.	A B C D	A B C D	A B C D
13.	A B C D	A B C D	A B C D
14.	A B C D	A B C D	A B C D
15.	A B C D	A B C D	A B C D
16.	A B C D	A B C D	A B C D
17.	A B C D	A B C D	A B C D
18.	A B C D	A B C D	A B C D
19.	A B C D	A B C D	A B C D
20.	A B C D	A B C D	A B C D
GROUP TOTALS	_ _ _ _	_ _ _ _	_ _ _ _

Does this review give an accurate indication of student

If not, what other evidence do you have of student lear

Teacher ______________________________

TALLYSHEET 4-4
TIVITY 4-16 (WORKSHEET 4-6)

PROBLEM-SOLVING PAGE		
Refrigerator	Wet and Warm	Unwrapped Sandwich
1	2	3
A B C D	A B C D	A B C D
A B C D	A B C D	A B C D
A B C D	A B C D	A B C D
A B C D	A B C D	A B C D
A B C D	A B C D	A B C D
A B C D	A B C D	A B C D
A B C D	A B C D	A B C D
A B C D	A B C D	A B C D
A B C D	A B C D	A B C D
A B C D	A B C D	A B C D
A B C D	A B C D	A B C D
A B C D	A B C D	A B C D
A B C D	A B C D	A B C D
A B C D	A B C D	A B C D
A B C D	A B C D	A B C D
A B C D	A B C D	A B C D
A B C D	A B C D	A B C D
A B C D	A B C D	A B C D
A B C D	A B C D	A B C D
A B C D	A B C D	A B C D
A B C D	A B C D	A B C D

– – – –   – – – –   – – – –

view give an accurate indication of student understanding? ☐ YES ☐ NO

other evidence do you have of student learning?

TALLYSHEET 4-5
ACTIVITY 4-19 (WORKSHEET 4-7)

For each of the questions in Activity 4-19, circle the letter each student marked.

	FOLLOWING DIRECTIONS PAGE		CON	
	Following Directions		Cycle	Microbes Bre
	Teacher Rating	Score	1	2
KEY	0 1 2 3 4 5	YES PART NO	A B C D	A B C D
STUDENT NUMBER				
1.	0 1 2 3 4 5	YES PART NO	A B C D	A B C D
2.	0 1 2 3 4 5	YES PART NO	A B C D	A B C D
3.	0 1 2 3 4 5	YES PART NO	A B C D	A B C D
4.	0 1 2 3 4 5	YES PART NO	A B C D	A B C D
5.	0 1 2 3 4 5	YES PART NO	A B C D	A B C D
6.	0 1 2 3 4 5	YES PART NO	A B C D	A B C D
7.	0 1 2 3 4 5	YES PART NO	A B C D	A B C D
8.	0 1 2 3 4 5	YES PART NO	A B C D	A B C D
9.	0 1 2 3 4 5	YES PART NO	A B C D	A B C D
10.	0 1 2 3 4 5	YES PART NO	A B C D	A B C D
11.	0 1 2 3 4 5	YES PART NO	A B C D	A B C D
12.	0 1 2 3 4 5	YES PART NO	A B C D	A B C D
13.	0 1 2 3 4 5	YES PART NO	A B C D	A B C D
14.	0 1 2 3 4 5	YES PART NO	A B C D	A B C D
15.	0 1 2 3 4 5	YES PART NO	A B C D	A B C D
16.	0 1 2 3 4 5	YES PART NO	A B C D	A B C D
17.	0 1 2 3 4 5	YES PART NO	A B C D	A B C D
18.	0 1 2 3 4 5	YES PART NO	A B C D	A B C D
19.	0 1 2 3 4 5	YES PART NO	A B C D	A B C D
20.	0 1 2 3 4 5	YES PART NO	A B C D	A B C D
GROUP TOTALS	_ _ _ _ _ _	_ _ _ _ _ _	_ _ _ _	_ _ _ _

Does this review give an accurate indication of stude

If not, what other evidence do you have of student le

Teacher________________________________

TALLYSHEET 4-5
ACTIVITY 4-19 (WORKSHEET 4-7)

DIRECTIONS PAGE		CONCEPTS PAGE			
ng Directions		Cycle	Microbes Breathe	Bread	Helpful Microbes
ating	Score	1	2	3	4
4 5	YES PART NO	A B [✓ C] D	A B [✓ C] D	[✓ A] B	A [✓ B] C D
4 5	YES PART NO	A B C D	A B C D	A B	A B C D
4 5	YES PART NO	A B C D	A B C D	A B	A B C D
4 5	YES PART NO	A B C D	A B C D	A B	A B C D
4 5	YES PART NO	A B C D	A B C D	A B	A B C D
4 5	YES PART NO	A B C D	A B C D	A B	A B C D
4 5	YES PART NO	A B C D	A B C D	A B	A B C D
4 5	YES PART NO	A B C D	A B C D	A B	A B C D
4 5	YES PART NO	A B C D	A B C D	A B	A B C D
4 5	YES PART NO	A B C D	A B C D	A B	A B C D
4 5	YES PART NO	A B C D	A B C D	A B	A B C D
4 5	YES PART NO	A B C D	A B C D	A B	A B C D
4 5	YES PART NO	A B C D	A B C D	A B	A B C D
4 5	YES PART NO	A B C D	A B C D	A B	A B C D
4 5	YES PART NO	A B C D	A B C D	A B	A B C D
4 5	YES PART NO	A B C D	A B C D	A B	A B C D
4 5	YES PART NO	A B C D	A B C D	A B	A B C D
4 5	YES PART NO	A B C D	A B C D	A B	A B C D
4 5	YES PART NO	A B C D	A B C D	A B	A B C D
4 5	YES PART NO	A B C D	A B C D	A B	A B C D
4 5	YES PART NO	A B C D	A B C D	A B	A B C D
_ _	_ _ _ _ _ _	_ _ _ _	_ _ _ _	_ _	_ _ _ _

review give an accurate indication of student understanding? ☐ YES ☐ NO

hat other evidence do you have of student learning?

TALLYSHEET 4-6
ACTIVITY 4-27 (WORKSHEET 4-9)

For each question
in Activity 4-27,
circle the letter
each student marked.

	FOLLOWING DIRECTIONS PAGE		
	Following Directions		Comic Boo
	Teacher Rating	Score	1
KEY	0 1 2 3 4 5	YES PART NO	A B C D
STUDENT NUMBER			
1.	0 1 2 3 4 5	YES PART NO	A B C D
2.	0 1 2 3 4 5	YES PART NO	A B C D
3.	0 1 2 3 4 5	YES PART NO	A B C D
4.	0 1 2 3 4 5	YES PART NO	A B C D
5.	0 1 2 3 4 5	YES PART NO	A B C D
6.	0 1 2 3 4 5	YES PART NO	A B C D
7.	0 1 2 3 4 5	YES PART NO	A B C D
8.	0 1 2 3 4 5	YES PART NO	A B C D
9.	0 1 2 3 4 5	YES PART NO	A B C D
10.	0 1 2 3 4 5	YES PART NO	A B C D
11.	0 1 2 3 4 5	YES PART NO	A B C D
12.	0 1 2 3 4 5	YES PART NO	A B C D
13.	0 1 2 3 4 5	YES PART NO	A B C D
14.	0 1 2 3 4 5	YES PART NO	A B C D
15.	0 1 2 3 4 5	YES PART NO	A B C D
16.	0 1 2 3 4 5	YES PART NO	A B C D
17.	0 1 2 3 4 5	YES PART NO	A B C D
18.	0 1 2 3 4 5	YES PART NO	A B C D
19.	0 1 2 3 4 5	YES PART NO	A B C D
20.	0 1 2 3 4 5	YES PART NO	A B C D
GROUP TOTALS	_ _ _ _ _ _	___ ___ __	_ _ _ _

Does this review give an accurate indica

If not, what other evidence do you have

Teacher________________________________

TALLYSHEET 4-6
ACTIVITY 4-27 (WORKSHEET 4-9)

	FOLLOWING DIRECTIONS PAGE		CONCEPTS PAGE			
	Following Directions		Comic Book	Garbage Problem	Microbes	Recycling
	Teacher Rating	Score	1	2	3	4
KEY R	0 1 2 3 4 5	YES PART NO	A B C D	A B C D E F G	A B C D	A B C D
1.	0 1 2 3 4 5	YES PART NO	A B C D	A B C D E F G	A B C D	A B C D
2.	0 1 2 3 4 5	YES PART NO	A B C D	A B C D E F G	A B C D	A B C D
3.	0 1 2 3 4 5	YES PART NO	A B C D	A B C D E F G	A B C D	A B C D
4.	0 1 2 3 4 5	YES PART NO	A B C D	A B C D E F G	A B C D	A B C D
5.	0 1 2 3 4 5	YES PART NO	A B C D	A B C D E F G	A B C D	A B C D
6.	0 1 2 3 4 5	YES PART NO	A B C D	A B C D E F G	A B C D	A B C D
7.	0 1 2 3 4 5	YES PART NO	A B C D	A B C D E F G	A B C D	A B C D
8.	0 1 2 3 4 5	YES PART NO	A B C D	A B C D E F G	A B C D	A B C D
9.	0 1 2 3 4 5	YES PART NO	A B C D	A B C D E F G	A B C D	A B C D
10.	0 1 2 3 4 5	YES PART NO	A B C D	A B C D E F G	A B C D	A B C D
11.	0 1 2 3 4 5	YES PART NO	A B C D	A B C D E F G	A B C D	A B C D
12.	0 1 2 3 4 5	YES PART NO	A B C D	A B C D E F G	A B C D	A B C D
13.	0 1 2 3 4 5	YES PART NO	A B C D	A B C D E F G	A B C D	A B C D
14.	0 1 2 3 4 5	YES PART NO	A B C D	A B C D E F G	A B C D	A B C D
15.	0 1 2 3 4 5	YES PART NO	A B C D	A B C D E F G	A B C D	A B C D
16.	0 1 2 3 4 5	YES PART NO	A B C D	A B C D E F G	A B C D	A B C D
17.	0 1 2 3 4 5	YES PART NO	A B C D	A B C D E F G	A B C D	A B C D
18.	0 1 2 3 4 5	YES PART NO	A B C D	A B C D E F G	A B C D	A B C D
19.	0 1 2 3 4 5	YES PART NO	A B C D	A B C D E F G	A B C D	A B C D
20.	0 1 2 3 4 5	YES PART NO	A B C D	A B C D E F G	A B C D	A B C D
ALS	_ _ _ _ _ _	___ ___ __	_ _ _ _	_ _ _ _ _ _ _	_ _ _ _	_ _ _ _

Does this review give an accurate indication of student understanding? ☐ YES ☐ NO

If not, what other evidence do you have of student learning?

TALLYSHEET 4-7
ACTIVITY 4-27 (WORKSHEET 4-10)

Category 1: Circle YES for each student who included a recycling use. Otherwise, circle NO.

Category 2: Circle the appropriate word to indicate whether each student finished the story completion task.

Category 3: Circle the appropriate word to indicate the medium each student used. If you circle OTHER, specify the medium used.

Interpretation and Recording in the Student Record of Progress:

This activity assesses the student's understanding of the concept of recycling and his reasoning ability in completing a story. Students who did not include a recycling use will need many additional experiences in completing stories in addition to extended experience with the concept of recycling.

Find the column marked Activity 4-27, Recycling Use, on the Concepts Page of the Student Record of Progress. Circle YES if the student included a recycling use. Otherwise, circle NO.

	CONCEPTS PAGE			
	Category 1		Category	
	Recycling Use		Completio	
KEY	YES	NO	FINISHED	INCO
STUDENT NUMBER				
1.	YES	NO	FINISHED	INCO
2.	YES	NO	FINISHED	INCO
3.	YES	NO	FINISHED	INCO
4.	YES	NO	FINISHED	INCO
5.	YES	NO	FINISHED	INCO
6.	YES	NO	FINISHED	INCO
7.	YES	NO	FINISHED	INCO
8.	YES	NO	FINISHED	INCO
9.	YES	NO	FINISHED	INCO
10.	YES	NO	FINISHED	INCO
11.	YES	NO	FINISHED	INCO
12.	YES	NO	FINISHED	INCO
13.	YES	NO	FINISHED	INCO
14.	YES	NO	FINISHED	INCO
15.	YES	NO	FINISHED	INCO
16.	YES	NO	FINISHED	INCO
17.	YES	NO	FINISHED	INCO
18.	YES	NO	FINISHED	INCO
19.	YES	NO	FINISHED	INCO
20.	YES	NO	FINISHED	INCO
GROUP TOTALS	___	___	______	___

Does this review give an accur

If not, what other evidence do

Teacher ______________________________

TALLYSHEET 4-7
ACTIVITY 4-27 (WORKSHEET 4-10)

	CONCEPTS PAGE							
	Category 1		Category 2		Category 3			
	Recycling Use		Completion		Medium Used			
KEY T NUMBER	YES	NO	FINISHED	INCOMPLETE	WRITTEN	TAPE	OTHER	(SPECIFY)
1.	YES	NO	FINISHED	INCOMPLETE	WRITTEN	TAPE	OTHER	________
2.	YES	NO	FINISHED	INCOMPLETE	WRITTEN	TAPE	OTHER	________
3.	YES	NO	FINISHED	INCOMPLETE	WRITTEN	TAPE	OTHER	________
4.	YES	NO	FINISHED	INCOMPLETE	WRITTEN	TAPE	OTHER	________
5.	YES	NO	FINISHED	INCOMPLETE	WRITTEN	TAPE	OTHER	________
6.	YES	NO	FINISHED	INCOMPLETE	WRITTEN	TAPE	OTHER	________
7.	YES	NO	FINISHED	INCOMPLETE	WRITTEN	TAPE	OTHER	________
8.	YES	NO	FINISHED	INCOMPLETE	WRITTEN	TAPE	OTHER	________
9.	YES	NO	FINISHED	INCOMPLETE	WRITTEN	TAPE	OTHER	________
10.	YES	NO	FINISHED	INCOMPLETE	WRITTEN	TAPE	OTHER	________
11.	YES	NO	FINISHED	INCOMPLETE	WRITTEN	TAPE	OTHER	________
12.	YES	NO	FINISHED	INCOMPLETE	WRITTEN	TAPE	OTHER	________
13.	YES	NO	FINISHED	INCOMPLETE	WRITTEN	TAPE	OTHER	________
14.	YES	NO	FINISHED	INCOMPLETE	WRITTEN	TAPE	OTHER	________
15.	YES	NO	FINISHED	INCOMPLETE	WRITTEN	TAPE	OTHER	________
16.	YES	NO	FINISHED	INCOMPLETE	WRITTEN	TAPE	OTHER	________
17.	YES	NO	FINISHED	INCOMPLETE	WRITTEN	TAPE	OTHER	________
18.	YES	NO	FINISHED	INCOMPLETE	WRITTEN	TAPE	OTHER	________
19.	YES	NO	FINISHED	INCOMPLETE	WRITTEN	TAPE	OTHER	________
20.	YES	NO	FINISHED	INCOMPLETE	WRITTEN	TAPE	OTHER	________
ROUP TOTALS	___	__	________	__________	_______	____	_____	________

Does this review give an accurate indication of student understanding? ☐YES ☐NO

If not, what other evidence do you have of student learning?

TALLYSHEET 4-8
ACTIVITY 4-28 (WORKSHEETS 4-11, 4-12, 4-13, and 4

Instructions for scoring Worksheets 4-11, 4-12, 4-13, and 4-14, and for interpreting results are given in Activity 4-28.

	CONCEPTS PAGE				
	Compost	Food Chains	Long Journey	Food Web	Inter
	1	2	3	4	
KEY	0 1 2 3 4 5	SNAKE GRASS OTHER	YES NO	YES NO	A
STUDENT NUMBER					
1.	0 1 2 3 4 5	SNAKE GRASS ____	YES NO	YES NO	A
2.	0 1 2 3 4 5	SNAKE GRASS ____	YES NO	YES NO	A
3.	0 1 2 3 4 5	SNAKE GRASS ____	YES NO	YES NO	A
4.	0 1 2 3 4 5	SNAKE GRASS ____	YES NO	YES NO	A
5.	0 1 2 3 4 5	SNAKE GRASS ____	YES NO	YES NO	A
6.	0 1 2 3 4 5	SNAKE GRASS ____	YES NO	YES NO	A
7.	0 1 2 3 4 5	SNAKE GRASS ____	YES NO	YES NO	A
8.	0 1 2 3 4 5	SNAKE GRASS ____	YES NO	YES NO	A
9.	0 1 2 3 4 5	SNAKE GRASS ____	YES NO	YES NO	A
10.	0 1 2 3 4 5	SNAKE GRASS ____	YES NO	YES NO	A
11.	0 1 2 3 4 5	SNAKE GRASS ____	YES NO	YES NO	A
12.	0 1 2 3 4 5	SNAKE GRASS ____	YES NO	YES NO	A
13.	0 1 2 3 4 5	SNAKE GRASS ____	YES NO	YES NO	A
14.	0 1 2 3 4 5	SNAKE GRASS ____	YES NO	YES NO	A
15.	0 1 2 3 4 5	SNAKE GRASS ____	YES NO	YES NO	A
16.	0 1 2 3 4 5	SNAKE GRASS ____	YES NO	YES NO	A
17.	0 1 2 3 4 5	SNAKE GRASS ____	YES NO	YES NO	A
18.	0 1 2 3 4 5	SNAKE GRASS ____	YES NO	YES NO	A
19.	0 1 2 3 4 5	SNAKE GRASS ____	YES NO	YES NO	A
20.	0 1 2 3 4 5	SNAKE GRASS ____	YES NO	YES NO	A
GROUP TOTALS	_ _ _ _ _ _	____ ____ ____	___ ___	___ ___	_

Teacher ______________________________

TALLYSHEET 4-8

VITY 4-28 (WORKSHEETS 4-11, 4-12, 4-13, and 4-14)

CONCEPTS PAGE							
Food Chains	Long Journey	Food Web	Interdependence	Decomposers		Planting in Compost	
2	3	4	5	6		7	
				Name	Function	Decomposed	Not Decomposed
KE GRASS OTHER	YES NO	YES NO	A B C D	YES NO	YES NO	0 1 2 3 4	0 1 2 3 4
KE GRASS ______	YES NO	YES NO	A B C D	YES NO	YES NO	0 1 2 3 4	0 1 2 3 4
KE GRASS ______	YES NO	YES NO	A B C D	YES NO	YES NO	0 1 2 3 4	0 1 2 3 4
KE GRASS ______	YES NO	YES NO	A B C D	YES NO	YES NO	0 1 2 3 4	0 1 2 3 4
KE GRASS ______	YES NO	YES NO	A B C D	YES NO	YES NO	0 1 2 3 4	0 1 2 3 4
KE GRASS ______	YES NO	YES NO	A B C D	YES NO	YES NO	0 1 2 3 4	0 1 2 3 4
KE GRASS ______	YES NO	YES NO	A B C D	YES NO	YES NO	0 1 2 3 4	0 1 2 3 4
KE GRASS ______	YES NO	YES NO	A B C D	YES NO	YES NO	0 1 2 3 4	0 1 2 3 4
KE GRASS ______	YES NO	YES NO	A B C D	YES NO	YES NO	0 1 2 3 4	0 1 2 3 4
E GRASS ______	YES NO	YES NO	A B C D	YES NO	YES NO	0 1 2 3 4	0 1 2 3 4
E GRASS ______	YES NO	YES NO	A B C D	YES NO	YES NO	0 1 2 3 4	0 1 2 3 4
E GRASS ______	YES NO	YES NO	A B C D	YES NO	YES NO	0 1 2 3 4	0 1 2 3 4
E GRASS ______	YES NO	YES NO	A B C D	YES NO	YES NO	0 1 2 3 4	0 1 2 3 4
E GRASS ______	YES NO	YES NO	A B C D	YES NO	YES NO	0 1 2 3 4	0 1 2 3 4
E GRASS ______	YES NO	YES NO	A B C D	YES NO	YES NO	0 1 2 3 4	0 1 2 3 4
E GRASS ______	YES NO	YES NO	A B C D	YES NO	YES NO	0 1 2 3 4	0 1 2 3 4
E GRASS ______	YES NO	YES NO	A B C D	YES NO	YES NO	0 1 2 3 4	0 1 2 3 4
E GRASS ______	YES NO	YES NO	A B C D	YES NO	YES NO	0 1 2 3 4	0 1 2 3 4
E GRASS ______	YES NO	YES NO	A B C D	YES NO	YES NO	0 1 2 3 4	0 1 2 3 4
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E GRASS ______	YES NO	YES NO	A B C D	YES NO	YES NO	0 1 2 3 4	0 1 2 3 4
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TALLYSHEET 4-8 (continued)
ACTIVITY 4-28 (WORKSHEETS 4-11, 4-12, 4-13, a

	CONCEPTS PAGE					
	Things That Breathe	Wet and Dry	Cool and Warm	Baking Bread	Food Cycles	Garbage
	8	9	10	11	12	13
KEY	YES NO	YES NO	YES NO	A B C D	YES NO	A B C D E
STUDENT NUMBER						
1.	YES NO	YES NO	YES NO	A B C D	YES NO	A B C D E
2.	YES NO	YES NO	YES NO	A B C D	YES NO	A B C D E
3.	YES NO	YES NO	YES NO	A B C D	YES NO	A B C D E
4.	YES NO	YES NO	YES NO	A B C D	YES NO	A B C D E
5.	YES NO	YES NO	YES NO	A B C D	YES NO	A B C D E
6.	YES NO	YES NO	YES NO	A B C D	YES NO	A B C D E
7.	YES NO	YES NO	YES NO	A B C D	YES NO	A B C D E
8.	YES NO	YES NO	YES NO	A B C D	YES NO	A B C D E
9.	YES NO	YES NO	YES NO	A B C D	YES NO	A B C D E
10.	YES NO	YES NO	YES NO	A B C D	YES NO	A B C D E
11.	YES NO	YES NO	YES NO	A B C D	YES NO	A B C D E
12.	YES NO	YES NO	YES NO	A B C D	YES NO	A B C D E
13.	YES NO	YES NO	YES NO	A B C D	YES NO	A B C D E
14.	YES NO	YES NO	YES NO	A B C D	YES NO	A B C D E
15.	YES NO	YES NO	YES NO	A B C D	YES NO	A B C D E
16.	YES NO	YES NO	YES NO	A B C D	YES NO	A B C D E
17.	YES NO	YES NO	YES NO	A B C D	YES NO	A B C D E
18.	YES NO	YES NO	YES NO	A B C D	YES NO	A B C D E
19.	YES NO	YES NO	YES NO	A B C D	YES NO	A B C D E
20.	YES NO	YES NO	YES NO	A B C D	YES NO	A B C D E

GROUP TOTALS ___ ___ ___ ___ ___ ___ _ _ _ _ ___ ___ _ _ _ _ _

Does this review give an accurate indication of student underst

If not, what other evidence do you have of student learning?

Teacher ______________________________

TALLYSHEET 4-8 (continued)

CTIVITY 4-28 (WORKSHEETS 4-11, 4-12, 4-13, and 4-14)

CONCEPTS PAGE							
Cool and Warm	Baking Bread	Food Cycles	Garbage	Decompose	Recycle	Less Garbage	Recycling Payoff Game
10	11	12	13	14	15	16	17
YES NO	A B C D	YES NO	A B C D E	A B C D E F	A B C D E F	A B C D	A B C D
YES NO	A B C D	YES NO	A B C D E	A B C D E F	A B C D E F	A B C D	A B C D
YES NO	A B C D	YES NO	A B C D E	A B C D E F	A B C D E F	A B C D	A B C D
YES NO	A B C D	YES NO	A B C D E	A B C D E F	A B C D E F	A B C D	A B C D
YES NO	A B C D	YES NO	A B C D E	A B C D E F	A B C D E F	A B C D	A B C D
YES NO	A B C D	YES NO	A B C D E	A B C D E F	A B C D E F	A B C D	A B C D
YES NO	A B C D	YES NO	A B C D E	A B C D E F	A B C D E F	A B C D	A B C D
YES NO	A B C D	YES NO	A B C D E	A B C D E F	A B C D E F	A B C D	A B C D
YES NO	A B C D	YES NO	A B C D E	A B C D E F	A B C D E F	A B C D	A B C D
YES NO	A B C D	YES NO	A B C D E	A B C D E F	A B C D E F	A B C D	A B C D
YES NO	A B C D	YES NO	A B C D E	A B C D E F	A B C D E F	A B C D	A B C D
YES NO	A B C D	YES NO	A B C D E	A B C D E F	A B C D E F	A B C D	A B C D
YES NO	A B C D	YES NO	A B C D E	A B C D E F	A B C D E F	A B C D	A B C D
YES NO	A B C D	YES NO	A B C D E	A B C D E F	A B C D E F	A B C D	A B C D
YES NO	A B C D	YES NO	A B C D E	A B C D E F	A B C D E F	A B C D	A B C D
YES NO	A B C D	YES NO	A B C D E	A B C D E F	A B C D E F	A B C D	A B C D
YES NO	A B C D	YES NO	A B C D E	A B C D E F	A B C D E F	A B C D	A B C D
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YES NO	A B C D	YES NO	A B C D E	A B C D E F	A B C D E F	A B C D	A B C D
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e an accurate indication of student understanding? ☐YES ☐NO

vidence do you have of student learning?

Me and my Environment

UNIT IV. TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT

UNIT IV OVERVIEW

The focus of Unit IV is on the interdependency that exists between man and his environment, and the degree to which man is capable of affecting the quality of his environment. Related activities treat sequentially the flow of energy through living things, the cyclical nature of materials, man's place in the recycling of resources, and how man can facilitate the natural cyclic system maintained by the environment.

The first core of activities attempts to develop the concept of transferring energy and matter through environmental systems (food chains, food webs). Its intent is to create a foundation or frame of reference for the student so he can relate later concepts to the finite quantity of his environmental resources.

The second core of activities concentrates on those concepts required for the student to understand the processes of decomposition as they occur in nature and as they can be affected by man's contribution to the environmental system. How can man act to facilitate or inhibit the decomposition processes?

The third core of activities is directed toward illuminating the effects that man can have on his environment through the materials that are made by him, used by him, and eventually disposed of by him. Concepts are developed to depict the importance of managing man's waste. Emphasis is placed on understanding the decomposition of non-biodegradable and biodegradable materials, and how these are related to the need to recycle certain components of the environment.

John Muir once said
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The earth is finite
we run out of most of th

Unit IV attempts to
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UNIT IV RATIONALE

John Muir once said, "When we try to pick out anything by itself, we find it hitched to everything else in the universe."

The earth is finite in size and material resources. Why then don't we run out of most of these resources?

Unit IV attempts to answer the question and to amplify the statement of interactions and interdependencies. The transfer of food energy along food chains is reconsidered, and the interlocking of these chains into more complex food webs is elaborated. Materials flow through the environment like energy. In contrast to energy, however, materials are continually cycled, or reused. A significant agent in all these cycling relationships is the large group of organisms classified under the heading of decomposers. Without the decomposers, cycling through the living community would soon cease to exist. Thus, a primary emphasis is placed on the role (both helpful and harmful) of decomposer organisms in the environment. Ways are suggested whereby the student can act on his environment through composting and other such activities. The unit contributes to the development of a success syndrome through continued practice in inquiry and problem-solving skills. It attempts to open up for the student new avenues of interest in the world around him.

Me and my Environment

UNIT IV. TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT

CORE A. THE FOOD CHAIN GAME REVISITED

AIMS FOR ME AND MY ENVIRONMENT

1. DEVELOPMENT IN EACH CHILD OF A SENSE OF IDENTITY AS A PERSON WHO HAS SOME DEGREE OF CONTROL OVER AND CAN ACT ON HIS ENVIRONMENT. This will lead to a degree of self-determination based on a rational coping with situations rather than on a passive compliance or an impulsive response to problems.
2. DEVELOPMENT IN EACH CHILD OF A SUCCESS SYNDROME. More than anything else, each activity is intended to be a success experience for each child. It is the teacher's responsibility -- almost obligation -- to see that each child succeeds at a level that is challenging to his abilities and that preserves his self-respect. It is a further responsibility of the teacher to point out his achievement. The students as a group should help each individual fit what he has done into a pattern of accomplishment.
3. DEVELOPMENT IN EACH CHILD OF AN INTEREST THAT COULD BECOME A HOBBY OR AVOCATION OVER A LIFETIME (through an exposure to an array of experiences in science). It is hoped that many children will find some area -- perhaps growing plants, caring for animals, identifying flowers, collecting things, or simply enjoying outings into the country -- that they feel strongly about and can develop some competence or knowledge in. This would provide a means of self-expression, and (perhaps) allow some degree of sharing or involvement with others.
4. DEVELOPMENT IN EACH CHILD OF A SENSE OF RELATIONSHIP AND EMPATHY WITH OTHER LIVING THINGS. It is hoped that this will lead to a positive regard and caring about what affects them as individuals and as a group, because what affects them affects the community of man.
5. DEVELOPMENT IN EACH CHILD OF AN UNDERSTANDING OF ENVIRONMENTAL CONDITIONS that will lead to a sense of responsibility for the environment and actions that protect or improve it.

1. Develop an understanding
2. Develop an understanding relationship of the mater
3. Recognize the role of dec
4. Realize that because cert to which man uses these m
5. Comprehend the role of ma nature.

1. Reconstruct the transfer systems.
2. Recognize the existence a plants and animals as a r

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UNIT IV. TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT

CORE A. THE FOOD CHAIN GAME REVISITED

BSCS

UNIT IV GOALS

1. Develop an understanding of the flow of energy through the living world.
2. Develop an understanding of cycling and appreciate the cycling relationship of the materials and organisms in the environment.
3. Recognize the role of decomposers in the cycling process.
4. Realize that because certain materials are in finite supply, the extent to which man uses these materials will have an impact on the environment.
5. Comprehend the role of man as an integral part of nature not apart from nature.

CORE A OBJECTIVES

1. Reconstruct the transfer of energy, food, and water through environmental systems.
2. Recognize the existence and importance of interrelationships between plants and animals as a result of eating and being eaten.

Me and my Environment

UNIT IV. TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT

CORE A. THE FOOD CHAIN GAME REVISITED

CORE A RATIONALE

Organisms interact with each other, and with the environment, in a variety of ways. Life is entirely dependent upon these interactions. The influences of one life form upon another are often very subtle, but man and his ability to succeed as a life form are controlled by these interactions. Because of man's ability to alter the environment, and because of his tendency to make a more dramatic impact on it, what may appear to be a simple, straightforward action can have a major, long-range impact on the very interactions man is dependent on. It is important for students to understand this concept. This core lays a foundation for a more thorough treatment of it later on in Unit V by reviewing energy flow and materials cycling in man's environment.

BACKGR

A food chain is a s
other. One living thing
by still another living
thing gets its life-sust
chain. All chains start
the green plant. This m
all other organisms by l
starch compounds. It is
elements and substances
through the living world
to manufacture food. Th
now stored temporarily i
is then passed on to the
person who eats the chic
other organism for food.
movement directly from p
plants, and animals supp
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BACKGROUND INFORMATION FOR THE TEACHER

A food chain is a series of organisms that interact by eating each other. One living thing is eaten by another, which in turn is utilized by still another living thing for food, and so forth. Each living thing gets its life-sustaining energy from the one previous to it in the chain. All chains start (or end, depending upon your viewpoint) with the green plant. This most fundamental cog of life produces food for all other organisms by locking the sun's energy into usable sugar and starch compounds. It is the plant that originally has drawn waterborne elements and substances from the soil and started them on their odyssey through the living world. A growing corn plant uses the sun's energy to manufacture food. The energy which originally came from the sun is now stored temporarily in a kernel of corn. The energy and food material is then passed on to the chicken that eats the corn, and then on to the person who eats the chicken. But few organisms depend solely upon one other organism for food. Man acquires material for growth and energy for movement directly from plants, as well as from other animals. These plants, and animals supply food to other organisms as well. One food chain is connected to many others; hence the interdependency and transfer cannot be viewed as a straight line, but must be seen as a highly complex and interconnecting relationship. Thus it is that the flow of materials and energy is presented in the context of the food web.

Me and my Environment

UNIT IV.
CORE A.

PLANNING GUIDE

NOTE: Some activities (*indicated in italics and an* ☛ *in th*
be prepared several days or weeks in advance. Use th
a teaching and preparation schedule. All supplies ne

Activity Number, Page, Tentative Teaching Time	Check List of Supplies Needed		
	Materials You Furnish	Materials in Supply Kit	(*Italics*
4-0. Making Compost		Equal-arm balance	One
	35 mm Slide projector		
	Bottle caps		Any soft dr
	4 Plastic bags		Sandwich ba
	Pieces of glass		Approximatel
Days needed: 1	Pieces of plastic		Approximatel bleach, an
	Potting soil or peat moss		Enough to f
	Soil from lawn or garden		Enough to f
	Organic matter		Dried leave grapefrui
	Large spoon to stir compost		Four
		Slide 4-0	Worksheet 4-
		Worksheet 4-0	Compost pil
		4 Plastic sweater boxes with lids	10 X 14 X 5

PLANNING GUIDE

ivities (*indicated in italics and an* ➡ *in the margin*) must
red several days or weeks in advance. Use this summary as
ng and preparation schedule. All supplies needed are listed.

BSCS

Supplies Needed Materials in Supply Kit	Notes and Suggestions to Teacher (*Italics and Arrow Indicate Advance Preparation Directions*)
Equal-arm balance	One
	Any soft drink bottle caps, need at least four
	Sandwich bags
	Approximately 2 X 2 inches, from any glass source
	Approximately 2 X 2 inches, from plastic bottles such as bleach, ammonia, etc.
	Enough to fill the two sweater boxes
	Enough to fill the two sweater boxes
	Dried leaves, grass clippings, potato peelings, orange and grapefruit rinds, pieces of carrots, apples, bananas, etc.
	Four
Slide 4-0	Worksheet 4-0
Worksheet 4-0	Compost pile daily record
4 Plastic sweater boxes with lids	10 X 14 X 5 inches, four per class

Me and my Environment

UNIT IV.
CORE A.

PLANNING GUIDE

NOTE: Some activities (*indicated in italics and* be prepared several days or weeks in advance. a teaching and preparation schedule. All suppli

Activity Number, Page, Tentative Teaching Time	Check List of Supplies Needed		
	Materials You Furnish	Materials in Supply Kit	(Ind
4-1. The Food Chain Game Revisited Days needed: 2	35 mm Slide projector	Plant and animal flash cards Food Chain Game cards Slide 4-1 Worksheet 4-1 Slide 4-2	Two deck Four deck Chain-lin Missing Workshee
4-2. Journey through a Food Chain Days needed: 1-2	35 mm Slide projector	Flash cards: Hawk Cow Mosquito Snake Man Grass Frog Energy symbol card Food symbol card Water symbol card Worksheet 4-2 Slide 4-3	*Order F* *(See A* One per One per One per Clues to Worksheet
4-3. The Long Journey Days needed: 1		Booklet, *The Long Journey*	One per

PLANNING GUIDE

BSCS

activities (*indicated in italics and an ↙ in the margin*) must
repared several days or weeks in advance. Use this summary as
ching and preparation schedule. All supplies needed are listed.

of Supplies Needed		Notes and Suggestions to Teacher (*Italics and Arrow Indicate Advance Preparation Directions*)
	Materials in Supply Kit	
	Plant and animal flash cards	Two decks per class
	Food Chain Game cards	Four decks per class
	Slide 4-1	Chain-link pictures of animals
	Worksheet 4-1	Missing links
	Slide 4-2	Worksheet 4-1, Missing links
	Flash cards:	
	Hawk	*Order film,* Garbage, *for Activity 4-20.* *(See Activity for details.)*
	Cow	
	Mosquito	
	Snake	
	Man	
	Grass	
	Frog	
	Energy symbol card	One per class
	Food symbol card	One per class
	Water symbol card	One per class
	Worksheet 4-2	Clues to Success - Food Chain
	Slide 4-3	Worksheet 4-2, Clues to Success - Food Chain
	Booklet, *The Long Journey*	One per student

Me and my Environment

UNIT IV.
CORE A.

PLANNING GUIDE

NOTE: Some activities (*indicated in italics and an* ❦ *in t* be prepared several days or weeks in advance. Use t a teaching and preparation schedule. All supplies n

Activity Number, Page, Tentative Teaching Time	Check List of Supplies Needed		
	Materials You Furnish	Materials in Supply Kit	(*Italics*
4-4. Food Webs Days needed: 1	Yarn Scissors Masking tape	Food Chain Game flash cards	Six to eigh One pair pe One roll, H One deck pe
4-5. Food Webs in My Community Days needed: 3	Clipboard 3 X 5 inch cards Yarn, string or masking tape	Tallysheet 4-2	For teacher For teacher
4-6. Food Webs in Other Places Days needed: 1	35 mm Slide projector	Slide 4-4 Slide 4-5 Slide 4-6 Slide 4-7 Slide 4-8 Slide 4-9	Fish in pond Alligator in Elk in mount Buffalo on g Constrictor Lion on veld
4-7. Clues to Success Days needed: 2	35 mm Slide projector Many magazines with plant and animal pictures Scissors Butcher paper Large felt pens or crayons Paste or tape	Worksheet 4-3	*Collect maga* One pair per One piece pe One per stud Some for eac Review of Su

PLANNING GUIDE

BSCS

vities (*indicated in italics and an* ➤ *in the margin*) must
ed several days or weeks in advance. Use this summary as
g and preparation schedule. All supplies needed are listed.

upplies Needed	Notes and Suggestions to Teacher (*Italics and Arrow Indicate Advance Preparation Directions*)
Materials in Supply Kit	
	Six to eight balls of different colors, one color per team
	One pair per team (include some left-handed ones)
	One roll, Hook Velcro may also be used
Food Chain Game flash cards	One deck per class
	For teacher use
Tallysheet 4-2	For teacher use
Slide 4-4	Fish in pond
Slide 4-5	Alligator in Everglades
Slide 4-6	Elk in mountain meadow
Slide 4-7	Buffalo on grassland
Slide 4-8	Constrictor in desert
Slide 4-9	Lion on veldt
	Collect magazines well in advance, several for each student
	One pair per student
	One piece per student
	One per student
	Some for each student
Worksheet 4-3	Review of Success

Me and my·
Environment

UNIT IV.
CORE A.

PLANNING GUIDE

NOTE: Some activities (*indicated in italics and an* ☛ *i*
be prepared several days or weeks in advance. Us
a teaching and preparation schedule. All supplie

Activity Number, Page, Tentative Teaching Time	Check List of Supplies Needed		
	Materials You Furnish	Materials in Supply Kit	(*Ita*
4-7. Clues to Success (continued)		Slide 4-10 Slide 4-11 Slide 4-12 Slide 4-13	Question Question Question Question

PLANNING GUIDE

activities (*indicated in italics and an* ◀ *in the margin*) must
epared several days or weeks in advance. Use this summary as
ching and preparation schedule. All supplies needed are listed.

BSCS

of Supplies Needed		Notes and Suggestions to Teacher (*Italics and Arrow Indicate Advance Preparation Directions*)
	Materials in Supply Kit	
	Slide 4-10	Question 1, Clues to Success
	Slide 4-11	Question 2, Clues to Success
	Slide 4-12	Question 3, Clues to Success
	Slide 4-13	Question 4, Clues to Success

Me and my Environment

Plastic sweater boxes with lids, 4 approximately 10 X 14 X 5 inches
Worksheet 4-0
Slide 4-0
Wire, 6 inches long
Equal-arm balance
*Bottle caps, 4
*Plastic sandwich bags, 4

(continued on next page)

*Not furnished in materials kit

FOCUS FOR THIS ACTIVITY

INQUIRY SKILLS:
Observing, Describing, Comparing, Speculating

PROBLEM-SOLVING SKILLS:
Experimenting, Recording Data

PRACTICAL APPLICATION:
Learning Gardening Skills, Practice in Writing Skills, Following Directions, Value of Natural Fertilizers

Activity 4-0. Making Compost

In this activity students will set up compost piles that will be used in later activities (4-10, 4-11, and 4-12) to demonstrate decomposition by microbes. Since the decomposition is a relatively slow process, the compost piles must be started at the beginning of the unit, so they will be ready to use as fertilized soil by Activity 4-11.

Teacher Preparation:

1. This activity involves setting up compost piles, watching them for several weeks, and recording changes in the compost. It will be necessary to take time at the beginning of your class period every week or so to observe the compost piles.

2. Collect the necessary materials and have them on a table in the classroom.

CTIVITY

LLS:
ing, Describing, Comparing, Speculating

VING SKILLS:
menting, Recording Data

PPLICATION:
ng Gardening Skills, Practice in
g Skills, Following Directions,
of Natural Fertilizers

aking Compost

students will set up compost piles that
ater activities (4-10, 4-11, and 4-12)
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a relatively slow process, the compost
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ty involves setting up compost piles,
em for several weeks, and recording
the compost. It will be necessary to
t the beginning of your class period
or so to observe the compost piles.

necessary materials and have them on
the classroom.

BSCS

UNIT IV. TRANSFER AND CYCLING
OF MATERIALS IN
MY ENVIRONMENT

ACTIVITY 4-0. MAKING COMPOST

During this activity, each student should:

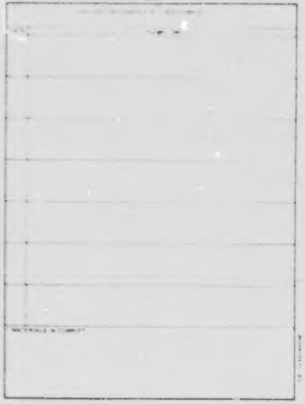
- *--participate in setting up a compost pile*
- *--speculate what will happen to the garbage in the compost pile*
- *--observe and record changes in the compost pile.*

ACTIVITY
4-0

MATERIALS

*Pieces of plastic approximately 2 X 2 inches
*Pieces of glass approximately 2 X 2 inches
*Other items of students' choice
*Potting soil or peat moss
*Soil from lawn or garden
*Organic matter such as:
  Potato peelings
  Leaves
  Orange and grapefruit rinds
  Grass clippings
  Coffee grounds
  Pieces of apple, banana, carrots, etc.
*35 mm Slide projector
*4 Large spoons

Worksheet 4-0



*Not furnished in materials kit

TEACHING STRATEGIES

Begin by saying:

> TODAY WE ARE GOING TO BEGIN AN EXPERIMENT TO FIND OUT WHAT HAPPENS TO GARBAGE.
>
> WHAT WOULD HAPPEN TO YOUR GARBAGE IF IT WAS JUST LEFT IN THE YARD AND NOT COLLECTED?
>
> WHERE WOULD YOU PUT SOMETHING IF YOU WANTED IT TO ROT QUICKLY?
>
> THINGS CAN ROT IN SOIL. WHY DO YOU SUPPOSE SOIL MIGHT BE A GOOD PLACE FOR THINGS TO ROT?

Now introduce the term "compost." Write the term on the chalkboard. Explain that a compost pile is where gardeners put grass clippings and similar plant garbage to rot.

Distribute Worksheet 4-0 to each student. Have students name each item that is to be added to the compost piles (sweater boxes), along with a brief description of its present condition, and list these on the chalkboard. When the list is complete, have each student copy it in the space at the bottom of the worksheet.

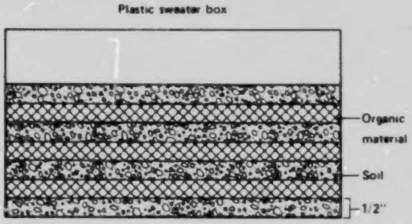
Use soil from your area in three of the boxes. Potting soil could be used in the fourth box as a comparison. Set up the compost piles in the manner illustrated in Diagram 4-0.

1. Place about one-half inch of soil in each sweater box.

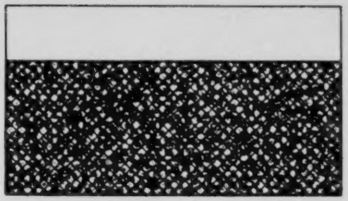
TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
ng:	
ARE GOING TO BEGIN AN EXPERIMENT TO WHAT HAPPENS TO GARBAGE.	
LD HAPPEN TO YOUR GARBAGE IF IT WAS T IN THE YARD AND NOT COLLECTED?	--respond, "Rot," "Get smelly," "Go icky," "Pile up," etc.
ULD YOU PUT SOMETHING IF YOU WANTED T QUICKLY?	--guess, "In the ground," "Bury it," "Don't know."
AN ROT IN SOIL. WHY DO YOU SUPPOSE HT BE A GOOD PLACE FOR THINGS TO ROT?	--speculate on why soil would be a good place for things to rot and give possible explanations such as, "Worms live there," "It's dirty," "It's damp," etc.
the term "compost." Write the term on the Explain that a compost pile is where grass clippings and similar plant garbage	
rksheet 4-0 to each student. Have students n that is to be added to the compost piles s), along with a brief description of its tion, and list these on the chalkboard. is complete, have each student copy it in the bottom of the worksheet.	
your area in three of the boxes. Potting used in the fourth box as a comparison. npost piles in the manner illustrated in	
bout one-half inch of soil in each sweater	

MATERIALS

Diagram 4-0



Before mixing



After mixing

TEACHING STRATEGIES

2. Add a layer of organic matter on top of the soil. The organic layer should consist of such things as fruit peelings, grass and leaves, potato peelings, etc. Avoid adding large pieces since they will take longer to decompose. Odor will be minimized if the organic matter added consists primarily of vegetable remains, avoiding animal proteins as much as possible. The compost still will get smelly!

3. Add another one-half inch layer of soil.

4. Continue this pattern until the boxes are about two-thirds full. Be sure that the boxes contain about half soil and half organic matter.

5. In the various layers of organic matter, have students place the bottle cap, plastic bag, piece of plastic, piece of glass, bits of paper, and other similar items students wish to bring to class.

Divide the class into four teams and proceed to set up the compost piles. Work slowly, explaining what to do at each step. As each item is put in the box, help focus attention by asking questions such as:

WHAT COLOR IS (item)?

HOW DOES THE (item) FEEL?

HOW DOES THE (item) SMELL?

Have at least one student weigh a piece of organic matter (orange peel) which will likely undergo decomposition, and an object (glass) which will not. Use the balance and weighing techniques first learned in Unit I to weigh a piece of orange peel about the size of a fifty-cent piece.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
of organic matter on top of the soil. layer should consist of such things lings, grass and leaves, potato c. Avoid adding large pieces since ke longer to decompose. Odor will if the organic matter added consists vegetable remains, avoiding animal much as possible. The compost still lly!	
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s pattern until the boxes are about ull. Be sure that the boxes contain oil and half organic matter.	
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nto four teams and proceed to set up Work slowly, explaining what to do each item is put in the box, help asking questions such as:	
(item)?	--respond appropriately.
(item) FEEL?	--respond appropriately.
(item) SMELL?	--respond appropriately.
student weigh a piece of organic l) which will likely undergo an object (glass) which will not. d weighing techniques first learned a piece of orange peel about the nt piece.	

ACTIVITY
4-0

MATERIALS

TEACHING STRATEGIES

Attach a piece of wire to the peel so the wire sticks out of the compost to mark the peel's location. Similarly, weigh and attach a wire to a piece of (glass). Record the initial weights. Reweigh them every few weeks and compare any changes in weight.

When all the contents have been added and mixed well, sprinkle enough water into the mixture to make the contents damp, but not muddy. Continue to add moisture to the boxes as needed periodically. After the contents are in the boxes, place a lid on each box and store them in a dark, warm place in your room. You can store the boxes in another place if they are too offensive for your room. If you live in a warm area, they can be stored and/or opened out-of-doors. Use your discretion here.

To terminate this set-up portion of the activity, ask students to make some predictions about what is going to happen by asking:

> DO YOU SUPPOSE THIS PILE OF STUFF IS GOING TO CHANGE? HOW?
>
> WHAT DO YOU THINK WILL HAPPEN TO THE (item)?

Repeat this question for all the objects you have placed in the compost pile.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
e of wire to the peel so the wire sticks npost to mark the peel's location. igh and attach a wire to a piece of ord the initial weights. Reweigh them ks and compare any changes in weight. contents have been added and mixed well, gh water into the mixture to make the , but not muddy. Continue to add moisture as needed periodically. After the contents xes, place a lid on each box and store t, warm place in your room. You can store another place if they are too offensive for f you live in a warm area, they can be opened out-of-doors. Use your discretion his set-up portion of the activity, ask ke some predictions about what is going to ng:	Students should:
PPOSE THIS PILE OF STUFF IS GOING TO HOW?	--make their predictions of expected changes in the compost.
OU THINK WILL HAPPEN TO THE (item)?	--make their predictions of expected changes in a specific item.
estion for all the objects you have compost pile.	--make predictions for all the objects in the compost piles.

ACCEPT ALL ANSWERS

MATERIALS

TEACHING STRATEGIES

Attach a piece of wire to the peel so the wire sticks out of the compost to mark the peel's location. Similarly, weigh and attach a wire to a piece of (glass). Record the initial weights. Reweigh them every few weeks and compare any changes in weight.

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> DO YOU SUPPOSE THIS PILE OF STUFF IS GOING TO CHANGE? HOW?

> WHAT DO YOU THINK WILL HAPPEN TO THE (item)?

Repeat this question for all the objects you have placed in the compost pile.

TEACHING STRATEGIES

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ompost to mark the peel's location.
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eks and compare any changes in weight.

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HOW?

YOU THINK WILL HAPPEN TO THE (item)?

uestion for all the objects you have
compost pile.

ACCEPT ALL ANSWERS

ANTICIPATED STUDENT BEHAVIORS

Students should:

--make their predictions of expected changes in the compost.

--make their predictions of expected changes in a specific item.

--make predictions for all the objects in the compost piles.

MATERIALS

Slide 4-0

TEACHING STRATEGIES

Project Slide 4-0 (Worksheet 4-0) and explain how the worksheet will be used to record any changes in the compost from day to day. Take about five minutes at the beginning of your class period once every week to stir up the compost and allow students to observe it. They should observe changes in color, texture, size, and odor of all the things added to the soil. Assist students in finding words to describe what they see, but do not tell them what is happening. Help them to express their observations by writing on the chalkboard the descriptive terms they suggest or others they may need. Keep the list brief and concise, eliminating similar or inappropriate terms. Once the description for that day has been agreed on, have the students copy the description on their worksheets.

Certain components in the compost piles will change noticeably between observations, and others will change very little. Individual pieces of organic material will eventually lose their identity. These changes will be noted and discussed further by students in Activities 4-10, 4-11, and 4-12. Over the observation period, work with your students' ability to observe, remember, compare, and record their findings.

TEACHING STRATEGIES

) (Worksheet 4-0) and explain how the
used to record any changes in the
tc day. Take about five minutes at
your class period once every week to
st and allow students to observe it.
ve changes in color, texture, size,
he things added to the soil. Assist
ng words to describe what they see,
hem what is happening. Help them to
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ntually lose their identity. These
oted and discussed further by students
0, 4-11, and 4-12. Over the observa-
with your students' ability to
, compare, and record their findings.

ANTICIPATED STUDENT BEHAVIORS

Upon completion of this activity, each student should, as a miminum:

--have participated in making a compost pile
--have written weekly observations of the compost on Worksheet 4-0.

UNIT IV, CORE A
ACTIVITY 4-0

Activity name suggested by class:

Teacher____________________

BSCS USE: Post___ Tally___ Rev___

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile ☐ Of value--needs the

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

11. Your rating of this activity:

☐ Worthwhile --keep as is	☐ Of value--needs the revision suggested	☐ Worth salvaging--make major changes described	☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s)______________ Comment:

Specific Questions:

12. What were students' reactions to making a compost pile? Comment:

13. Did any students have difficulty weighing the orange peel and piece of glass?
☐ Yes ☐ No Explain:

Teacher ______________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

BSCS Evaluation: EMH Feedback Form 1d

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff (we will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

1. Develop an understanding of the flow of energy through the living world.

5. Comprehend the role of man as an integral part _of_ nature not apart _from_ nature.

Core A Objectives for the Student:

1. Reconstruct the transfer of energy, food, and water through environmental systems.

2. Recognize the existence and importance of interrelationships between plants and animals as a result of eating and being eaten.

ENVIRONMENTAL THEME:

Interrelationships of Environmental Components, Flow of Energy

INQUIRY SKILLS:

Identifying, Associating

PROBLEM-SOLVING SKILLS:

Discussion and Treatment of Group Data, Explaining, Defending, Answering Why Questions

PRACTICAL APPLICATION:

Working in Groups, Following Directions

CTIVITY

oals for the Student:

Develop an understanding of the flow of energy through the living world.

Comprehend the role of man as an integral part of nature not apart from nature.

Objectives for the Student:

Reconstruct the transfer of energy, food, and water through environmental systems.

Recognize the existence and importance of interrelationships between plants and animals as a result of eating and being eaten.

L THEME:
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Energy

LS:
ying, Associating

ING SKILLS:
ion and Treatment of Group Data,
ing, Defending, Answering Why Questions

PLICATION:
in Groups, Following Directions

BSCS

UNIT IV.	TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT
CORE A.	ENERGY AND MATERIAL TRANSFER
ACTIVITY 4-1.	THE FOOD CHAIN GAME REVISITED

ACTIVITY
4-1

MATERIALS

2 Decks of plant and animal flash cards
4 Decks of Food Chain Game cards
Worksheet 4-1
Slide 4-1
Slide 4-2
*35 mm Slide projector

*Not furnished in materials kit

TEACHING STRATEGIES

Activity 4-1. The Food Chain Game Revisited

This activity will give the students an opportunity to review the concepts associated with building food chains. Students will build food chains and trace energy flow along the chain. Emphasis will be placed on the concept that all food for animals (including man) comes from plants.

Teacher Preparation:

1. Have available ample table space for four groups to play the card game.

2. This activity, because of its length, is divided into Part I and Part II. The first part introduces the concept of food chains, stressing that they end in a plant. The second part of the activity consists of a game that gives the students an opportunity to build food chains.

Some students may remember this game from their experience with it in Unit III. Capitalize on the awareness of such students by placing one of them in each group of students taking part in this activity. They may act as catalysts in initiating discussion. Ask the experienced students, also, to teach new students.

Part I.

Hold up the deck of flash cards and say:

> HOW MANY OF YOU REMEMBER PLAYING THIS SCIENCE GAME?
>
> WHAT DID WE LEARN FROM THE GAME?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
The Food Chain Game Revisited *y will give the students an opportunity to oncepts associated with building food dents will build food chains and trace along the chain. Emphasis will be placed ot that all food for animals (including rom plants.* aration: vailable ample table space for four groups the card game. tivity, because of its length, is divided rt I and Part II. The first part intro- he concept of food chains, stressing that d in a plant. The second part of the y consists of a game that gives the s an opportunity to build food chains. may remember this game from their exper- in Unit III. Capitalize on the awareness nts by placing one of them in each group aking part in this activity. They may sts in initiating discussion. Ask the tudents, also, to teach new students.	*During this activity, each student should:* *--successfully play the Food Chain Game* *--defend a food chain sequence* *--complete Worksheet 4-1.*
eck of flash cards and say: OF YOU REMEMBER PLAYING THIS SCIENCE	Students should: --indicate whether or not they recall the game.
WE LEARN FROM THE GAME?	--recall the game and respond: "We learned what a food chain is." "A food chain is some animals that eat other animals." "All food in a food chain starts with plants." "We learned who ate who."

MATERIALS	TEACHING STRATEGIES

To reinforce this idea, continue by saying:

> ONE THING WE DID IN THIS GAME WAS DECIDE WHAT ANIMALS EAT.
>
> (Student's name), FIND THE CARD THAT PICTURES A HAWK.

Select a student to fasten the card to the chalkboard with tape, or set the card on the left side of the chalk tray.

> (Student's name), FIND A CARD THAT PICTURES WHAT THE HAWK MIGHT EAT.

Say:

> HAWKS EAT __________ AND OTHER THINGS.

Have the student fasten or set up the picture to the right of the hawk.

> (Student's name), DRAW AN ARROW FROM THE HAWK TO THE __________ TO SHOW THAT A HAWK EATS A __________.

Continue to build a food chain by saying:

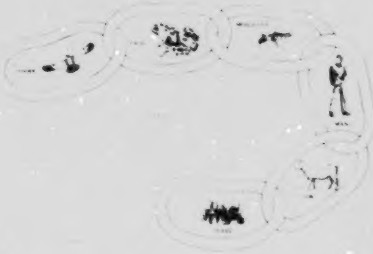
> NOW WHAT DO YOU THINK (prey) EAT?

The hawk, since it eats another animal, is called a predator. Any animal eaten by another is referred to as the prey. Do not expect students to use these terms if they are not familiar with them.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
idea, continue by saying:	
DID IN THIS GAME WAS DECIDE WHAT	
ame), FIND THE CARD THAT PICTURES	--select the hawk card.
o fasten the card to the chalkboard the card on the left side of the chalk	
ame), FIND A CARD THAT PICTURES MIGHT EAT.	--select a card depicting a frog, snake, chicken, mouse, rabbit, or bird.
_______ AND OTHER THINGS.	
asten or set up the picture to the	
ame), DRAW AN ARROW FROM THE HAWK _____ TO SHOW THAT A HAWK EATS A	--draw an arrow pointing from the hawk to the prey.
a food chain by saying:	
OU THINK (prey) EAT?	--select appropriate food of the prey, place it to the right of the first two cards, and draw an arrow between the two.
eats another animal, is called a mal eaten by another is referred to ot expect students to use these not familiar with them.	

MATERIALS

Slide 4-1



TEACHING STRATEGIES

On the back of each flash card is listed the food normally eaten by the animal. Certain animals, of course, may on occasion eat food other than listed. If this issue arises, simply explain that exceptions in the listed eating habits may occur, but for purposes of the game only the listed foods will be used.

Continue until you have completed a logical food chain down to the plant source. Some possible examples follow:

HAWK → SNAKE → MOUSE → GRASSHOPPER → GRASS

HAWK → MOUSE → GRAIN

HAWK → FROG → MOSQUITO → MAN → COW → GRASS

HAWK → SONG BIRD → WORM → LEAF

Project Slide 4-1 and say:

NOTICE THAT WE HAVE SEVERAL ANIMALS THAT EAT OTHER ANIMALS FOR FOOD. SINCE EACH EATS THE ONE NEXT TO IT WE CAN THINK OF THEM AS BEING LINKED TOGETHER.

Point to the hawk and frog and say:

WHY IS THE HAWK LINKED TO THE FROG?

> If the desired response is not given, ask:
>
> WHAT DO HAWKS EAT?

Point to the mosquito and say:

WHAT IS THE FROG LINKED TO?

WHY?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
f each flash card is listed the food n by the animal. Certain animals, of n occasion eat food other than listed. arises, simply explain that exceptions eating habits may occur, but for purposes nly the listed foods will be used.	
l you have completed a logical food the plant source. Some possible ow:	
SNAKE → MOUSE → GRASSHOPPER → GRASS	
MOUSE → GRAIN	
FROG → MOSQUITO → MAN → COW → GRASS	
SONG BIRD → WORM → LEAF	
4-1 and say:	
HAT WE HAVE SEVERAL ANIMALS THAT EAT IMALS FOR FOOD. SINCE EACH EATS THE TO IT WE CAN THINK OF THEM AS BEING OGETHER.	
hawk and frog and say:	
HE HAWK LINKED TO THE FROG?	--respond, "For food."
the desired response is not given, ask:	
T DO HAWKS EAT?	--respond, "Frogs," "Snakes," "Mice."
mosquito and say:	
THE FROG LINKED TO?	--respond, "Mosquito."
	--reply, "Because it likes them," "It eats bugs," "For food."

MATERIALS	TEACHING STRATEGIES

Continue in a similar manner on down the food chain to the grass. Then say:

> SINCE EACH IS LINKED TO THE NEXT BECAUSE OF WHAT IT EATS, WE CALL THIS A FOOD CHAIN.

Continue by saying:

> WHY DO ANIMALS NEED FOOD?
>
> WHY DO YOU NEED FOOD?
>
> WHAT IS STORED IN FOOD THAT HELPS ANIMALS TO DO THINGS AND TO GROW?

> If students' responses include such things as sugar or starch, and energy is not mentioned, then ask:
>
> WHAT IS STORED IN THE SUGAR OR STARCH THAT IS NEEDED FOR GROWING AND DOING THINGS?

Point to the chain on Slide 4-1, and say:

> LET'S THINK OF ENERGY THAT COMES FROM FOOD. STARTING WITH THE PLANT, TRACE ENERGY ALONG THE FOOD CHAIN.

As the student does the tracing, say:

> ENERGY FROM THE GRASS PASSES TO THE COW AS THE COW EATS AND DIGESTS THE GRASS. THE COW USES SOME OF IT TO LIVE AND GROW AND STORES SOME OF IT IN ITS FAT AND MUSCLES. ENERGY PASSES FROM THE COW TO THE MAN AS HE EATS THE

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
nilar manner on down the food chain to say: IS LINKED TO THE NEXT BECAUSE OF S, WE CALL THIS A FOOD CHAIN.	
ng: ALS NEED FOOD?	--respond, "To grow," "To live," "So they won't be hungry."
NEED FOOD?	--respond, "The same thing," "To grow," "To live."
RED IN FOOD THAT HELPS ANIMALS TO ID TO GROW?	--recall activities in Unit III and respond, "Energy."
lents' responses include such things ar or starch, and energy is not ned, then ask: STORED IN THE SUGAR OR STARCH NEEDED FOR GROWING AND DOING	--respond, "Energy."
n on Slide 4-1, and say: OF ENERGY THAT COMES FROM FOOD. H THE PLANT, TRACE ENERGY ALONG AIN.	--point to the plant and then to each succeeding animal in the chain.
es the tracing, say: THE GRASS PASSES TO THE COW AS AND DIGESTS THE GRASS. THE COW IT TO LIVE AND GROW AND STORES N ITS FAT AND MUSCLES. ENERGY THE COW TO THE MAN AS HE EATS THE	

MATERIALS

TEACHING STRATEGIES

HAMBURGER. THEN IT GOES FROM THE MAN TO THE MOSQUITO AS THE MOSQUITO SUCKS BLOOD FROM THE MAN...ETC.

WHERE DID THE HAWK'S ENERGY FIRST COME FROM?

> If students have difficulty answering this question, trace the chain in reverse order by saying:
>
> THE HAWK GOT ITS ENERGY FROM THE FROG, WHO GOT ITS ENERGY FROM THE MOSQUITO, WHO GOT ITS ENERGY FROM THE MAN...ETC.

Build one or two more chains with the entire class. Then divide the class into two groups and distribute one set of flash cards to each group. Have the groups build chains until you feel that the students have fully grasped the idea of the chaining of foods and food energy.

When students are building chains, ask them to begin with man and use the cards to build chains of things he eats. Have them temporarily put the cards on the floor, against the wall, or on a table.

Have the groups display their chains from left to right on the chalk tray. You may wish to encourage competition by asking which group can build the longest chain. Then follow with discussion, questions, and answers.

Say:

THERE ARE MANY FOOD CHAINS WHERE ANIMALS EAT OTHER LIVING THINGS FOR FOOD. THE ANIMAL

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
R. THEN IT GOES FROM THE MAN TO THE AS THE MOSQUITO SUCKS BLOOD FROM THE C.	
D THE HAWK'S ENERGY FIRST COME FROM?	--reply, "The grass that the cow ate."
students have difficulty answering s question, trace the chain in erse order by saying:	
HAWK GOT ITS ENERGY FROM THE FROG, GOT ITS ENERGY FROM THE MOSQUITO, GOT ITS ENERGY FROM THE MAN...ETC.	
two more chains with the entire class. e class into two groups and distribute sh cards to each group. Have the groups ntil you feel that the students have the idea of the chaining of foods and	
are building chains, ask them to begin se the cards to build chains of things them temporarily put the cards on the the wall, or on a table.	--will build such examples as: MAN ⟶ CHICKEN ⟶ GRASSHOPPER ⟶ GRASS MAN ⟶ COW ⟶ CORN.
s display their chains from left to halk tray. You may wish to encourage asking which group can build the Then follow with discussion, questions,	
MANY FOOD CHAINS WHERE ANIMALS EAT ING THINGS FOR FOOD. THE ANIMAL	

MATERIALS

TEACHING STRATEGIES

LINKS ARE NOT ALWAYS THE SAME, BUT ALL CHAINS DO HAVE ONE THING THAT IS THE SAME. WHAT IS THE SAME?

> If students fail to see that each chain ends with a plant, ask:
>
> LOOK AT THE END OF EACH CHAIN. (Point to the right side.) WHAT IS THE SAME ABOUT EACH OF THESE LIVING THINGS?
>
> Say:
>
> IF WE WERE TO BUILD MORE FOOD CHAINS, WHAT WOULD WE EXPECT TO FIND AT THE END OF THE CHAIN?

Make sure this concept is clear before proceeding.

Slide 4-2, Worksheet 4-1

CLUES TO

Clues to Success:

Place randomly on the chalk tray the following cards, which represent correct responses to the blanks on the worksheet: snake grass grain chicken insect worms.

Distribute Worksheet 4-1 and project Slide 4-2. Point to the cards and the blanks and say:

> THESE PICTURES SHOW THE MISSING LINKS ON YOUR WORKSHEET. THE WORDS ON THE CARDS ARE TO BE WRITTEN IN THE BLANK SPACES. SEE IF YOU CAN FILL IN THE BLANKS WITH THE RIGHT WORD.

TEACHING STRATEGIES

T ALWAYS THE SAME, BUT ALL CHAINS
THING THAT IS THE SAME. WHAT IS

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th a plant, ask:

THE END OF EACH CHAIN. (Point
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ULD WE EXPECT TO FIND AT THE
THE CHAIN?

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CLUES TO SUCCESS

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S SHOW THE MISSING LINKS ON YOUR
HE WORDS ON THE CARDS ARE TO BE
E BLANK SPACES. SEE IF YOU CAN
LANKS WITH THE RIGHT WORD.

ANTICIPATED STUDENT BEHAVIORS

Students should:

--respond, "All begin with an animal," "Linked together," "I don't know," "All end in a plant."

--respond, "All are plants."

--recall, "Plants."

ACTIVITY
4-1

MATERIALS

TEACHING STRATEGIES

WRITE THE NAME OF THE LINK IN THE PROPER SPACE.

WHEN YOU HAVE FILLED IN THE BLANKS IN THE FIRST THREE QUESTIONS, WRITE TWO WORDS IN THE BLANKS TO COMPLETE QUESTION FOUR.

Ask students to put their names on the worksheets and collect them to look at later. Now write the first chain on the chalkboard and ask different students to tell (and defend) what could go in the blanks. Do this for the second and third chains. Remember there are several answers possible for each. Encourage discussion. Praise all good ideas. Return worksheets after results are recorded on Tallysheet 4-1. Save Tallysheet 4-1 for recording the results of Activity 4-2.

After class, review the worksheets and record the results in the Student Record of Progress.

Items 1, 2, and 3 assess the student's understanding of the dependence of living things on each other in a food chain. This understanding includes the concept that all food chains end with plants. In the Understanding Section of the Student Record of Progress, circle YES if all responses are acceptable. Circle NO if any of the food chains are incorrect and give these particular students encouragement and support when they play the Food Chain Game. Additional opportunity is provided in Activity 4-2 for mastering this concept.

TEACHING STRATEGIES

NAME OF THE LINK IN THE PROPER SPACE.

HAVE FILLED IN THE BLANKS IN THE FIRST
STIONS, WRITE TWO WORDS IN THE BLANKS
TE QUESTION FOUR.

o put their names on the worksheets and
o look at later. Now write the first
halkboard and ask different students to
nd) what could go in the blanks. Do this
and third chains. Remember there are
s possible for each. Encourage discussion.
d ideas. Return worksheets after results
n Tallysheet 4-1. Save Tallysheet 4-1 for
results of Activity 4-2.

HAVE YOU
INVOLVED
ALL
STUDENTS?

eview the worksheets and record the
Student Record of Progress.

d 3 assess the student's understanding of
of living things on each other in a food
nderstanding includes the concept that all
d with plants. In the Understanding
Student Record of Progress, circle YES
es are acceptable. Circle NO if any of
s are incorrect and give these particular
ragement and support when they play the
e. Additional opportunity is provided in
or mastering this concept.

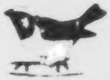
ANTICIPATED STUDENT BEHAVIORS

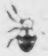
Students should:

--study the choices in the chalk tray and write in an appropriate link in the blanks on the worksheet. Correct answers for each chain are:

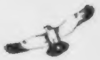
1. HAWK ⟶ SNAKE ⟶ MOUSE ⟶ GRASS or GRAIN
2. MAN ⟶ COW ⟶ GRASS or GRAIN
3. LION ⟶ CHICKEN ⟶ INSECTS or WORMS ⟶ GRASS
4. These are all called FOOD CHAINS.

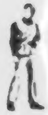
MATERIALS

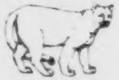

Bird

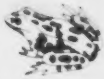

Spider

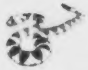
Chicken

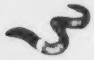

Hawk

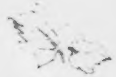

Man

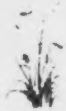

Mountain lion


Frog

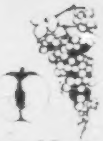

Snake

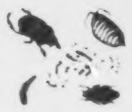

Worm


Leaves


Grasses

Grain


Fruits & Berries


Decomposers

TEACHING STRATEGIES

Part II. The Next Day.

TODAY WE ARE GOING TO PLAY THE FOOD CHAIN GAME.

Prepare the students to play by dividing the class into groups of three or four. Distribute a deck of Food Chain Game cards to each group. Allow time for them to examine the cards.

Say:

IN THIS GAME WE ARE GOING TO BUILD FOOD CHAINS. YOU WILL DO THIS BY USING THE LIVING THINGS PICTURED ON THE CARDS. THIS GAME IS SIMILAR TO THE RUMMY GAME YOU PLAYED BEFORE. I'LL EXPLAIN THE RULES AS I PLAY THE GAME WITH TWO OF YOU SO YOU WILL KNOW HOW TO PLAY IT.

1. SHUFFLE THE DECK AND DEAL FOUR CARDS TO EACH PLAYER.
2. PLACE THE REST OF THE CARDS FACE DOWN IN THE MIDDLE OF THE TABLE AND TURN THE TOP CARD FACE UP. (Demonstrate.)
3. LOOK AT THE CARDS IN YOUR HAND TO SEE IF ANY OF YOUR CARDS FORM A FOOD CHAIN. (Show your cards to demonstrate.) REMEMBER, CHAINS MUST BE COMPLETE -- THEY MUST BEGIN WITH AN ANIMAL AND END WITH A PLANT.
4. THE PLAYER TO MY LEFT WILL PLAY FIRST. BEFORE YOU LAY ANY CARDS DOWN, DRAW EITHER THE TOP CARD FROM THE FACE-DOWN PILE OR THE TOP CARD FROM THE FACE-UP PILE.

TEACHING STRATEGIES

xt Day.

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OU LAY ANY CARDS DOWN, DRAW
HE TOP CARD FROM THE FACE-DOWN
THE TOP CARD FROM THE FACE-UP

ANTICIPATED STUDENT BEHAVIORS

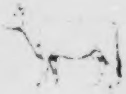
Students should:

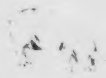
--examine the decks to become acquainted with individual cards.

ACTIVITY
4-1

MATERIALS

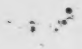
Insects


Cow

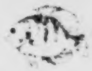

Pig

Rabbit

Deer


Mouse

Mosquito


Fish

Turtle

TEACHING STRATEGIES

5. IF YOU HAVE ONE OR MORE FOOD CHAINS IN YOUR HAND, LAY THE CARDS FACE UP ON THE TABLE IN THE CORRECT ORDER, TELLING WHO EATS WHOM AS YOU DO SO. LAY THE CARDS DOWN SO THEY FORM A CHAIN FROM LEFT TO RIGHT.

6. THEN PICK FROM THE FACE-DOWN PILE THE NUMBER OF CARDS YOU JUST PUT DOWN SO YOU AGAIN HAVE FIVE CARDS, THEN DISCARD ONE. EACH OF YOU WILL HAVE FOUR CARDS AT THE BEGINNING OF YOUR TURN. DRAW ONE SO THAT DURING YOUR TURN YOU HAVE FIVE CARDS, AND DISCARD AT THE END OF YOUR TURN (BACK TO FOUR CARDS).

7. CONTINUE AROUND THE GROUP UNTIL EVERYONE HAS A TURN. CARDS DRAWN ARE USED TO FORM NEW CHAINS OR TO ADD TO OTHERS. (For example: A student may lay down a mouse, insect, and grain as a chain. During a later turn, a snake could be added to the beginning of the chain. A card can also be added to the middle of a chain.)

8. EACH CARD IS WORTH ONE POINT. THE FIRST PERSON TO LAY DOWN ENOUGH CHAINS SO THAT HE HAS AT LEAST TEN POINTS IS THE WINNER. ALL FOOD CHAINS MUST BE COMPLETE AND END WITH A PLANT.

NOTE: If any questions arise about what eats what, make it clear that for purposes of the game the eating habits as described on the large flash cards will be the only ones accepted.

If students encounter difficulty in remembering what each animal normally eats, you may find it helpful to write this information on the chalkboard.

TEACHING STRATEGIES

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ANTICIPATED STUDENT BEHAVIORS

MATERIALS

TEACHING STRATEGIES

Animal	What He Eats
Bird	Grain, Worms, Insects
Snake	Frogs, Mice, Insects, Worms
etc.	etc.

DEMONS

Allow the students to play the game as long as it seems appropriate, assisting when necessary.

Conclude by saying:

> WHAT HAVE WE LEARNED FROM PLAYING THIS GAME?
>
> WHY ARE PLANTS IMPORTANT?
>
> WHY ARE ANIMALS IMPORTANT TO EACH OTHER?

TEACHING STRATEGIES

What He Eats

Grain, Worms, Insects
Frogs, Mice, Insects, Worms
etc.

DEMONSTRATE

ts to play the game as long as it seems
sting when necessary.

g:

LEARNED FROM PLAYING THIS GAME?

TS IMPORTANT?

ALS IMPORTANT TO EACH OTHER?

ANTICIPATED STUDENT BEHAVIORS

Students should:

--demonstrate ability to play the game following the rules described.

--respond, "Animals are important to each other and depend on each other," "All animals depend on plants."

--conclude, "They are at the end of the food chain," "Animals eat them," etc.

--conclude, "Because they eat each other," "They get energy from each other," "They wouldn't have any food without each other," "They'd die." Statements should indicate interdependency of living things in terms of food.

Upon completion of this activity, each student should, as a minimum:

--be able to trace energy through a food chain
--be able to construct a simple food chain
--be able to state that food chains end in plants
--be able to state that animals depend on other animals or plants for their food.

ACTIVITY
4-1

MATERIALS

TEACHING STRATEGIES

CHANG

See Change of Pacers 1, 2, and 3.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
CHANGE OF PACER Pacers 1, 2, and 3.	

UNIT IV, CORE A
ACTIVITY 4-1

Activity name suggested by class:

Teacher_____________________

BSCS USE: Post___ Tally___ Rev___

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile ☐ Of value--needs the ☐ Worth salvaging--make ☐ Worthl

BSCS Evaluation: EMH Feedback Form 1d

Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is
☐ Of value--needs the revision suggested
☐ Worth salvaging--make major changes described
☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s)____________ Comment:

Specific Questions:

12. How many students remembered the Food Chain Game from Unit III?
☐ All ☐ Most ☐ Half ☐ Few ☐ None Comment:

13. Could most students build a food chain? ☐ Yes ☐ No Comment:

14. Were any students unable to play Food Chain Game? ☐ No ☐ Yes
If yes, who?

Side A

Teacher ______________________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

BSCS Evaluation: EMH Feedback Form 1d

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff (we will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

Me and my Environment

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

1. Develop an understanding of the flow of energy through the living world.

5. Comprehend the role of man as an integral part *of* nature not apart *from* nature.

Core A Objectives for the Student:

1. Reconstruct the transfer of energy, food, and water through environmental systems.

2. Recognize the existence and importance of interrelationships between plants and animals as a result of eating and being eaten.

ENVIRONMENTAL THEME:

Interrelationships of Environmental Components, Complementarity of Organisms and Environment

INQUIRY SKILLS:

Identifying, Describing

PROBLEM-SOLVING SKILLS:

Knowing Question and Task

PRACTICAL APPLICATION:

Vocabulary Building, Communication, and Following Directions

CTIVITY

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Comprehend the role of man as an integral part of nature not apart from nature.

Objectives for the Student:

Reconstruct the transfer of energy, food, and water through environmental systems.

Recognize the existence and importance of interrelationships between plants and animals as a result of eating and being eaten.

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mentarity of Organisms and Environment

LS:
ying, Describing

ING SKILLS:
Question and Task

PLICATION:
ary Building, Communication, and
ng Directions

BSCS

UNIT IV.	TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT
CORE A.	ENERGY AND MATERIAL TRANSFER
ACTIVITY 4-2.	JOURNEY THROUGH A FOOD CHAIN

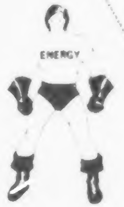
ACTIVITY
4-2

MATERIALS

Flash cards:
- Hawk
- Cow
- Mosquito
- Snake
- Man
- Grass
- Frog

Energy symbol card
Food symbol card
Water symbol card
Slide 4-3
Worksheet 4-2
*35 mm Slide projector

Energy symbol



*Not furnished in materials kit

TEACHING STRATEGIES

Activity 4-2. Journey through a Food Chain

The preceding activity emphasized the transfer of energy from one organism to another. This activity focuses on the transfer of food material and water, as well as energy, between organisms.

Teacher Preparation:

Set up in random order on the chalkboard tray the flash cards indicated in the materials column. Ask for a student volunteer to arrange the cards into one food chain that utilizes every card.

Point to the food chain on the chalkboard tray and say:

> WHAT WERE WE TALKING ABOUT YESTERDAY THAT MOVED FROM ONE FOOD TO ANOTHER IN A FOOD CHAIN?
>
> ALL FOOD CONTAINS ENERGY.

Hold up the energy symbol and say:

> I WILL USE THIS SYMBOL TO REPRESENT THE ENERGY IN FOOD. I'M PLACING THIS SYMBOL FOR ENERGY IN THE GRASS. (Student's name), MOVE THE ENERGY SYMBOL TO WHERE THE ENERGY GOES NEXT IN THIS FOOD CHAIN.

After the student has correctly placed the symbol on the cow, ask:

> (Student's name), HOW DOES THE COW GET THE ENERGY?

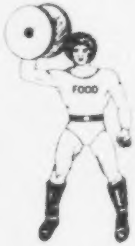
INVO
SLO
STU

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
Journey through a Food Chain *activity emphasized the transfer of energy nism to another. This activity focuses on of food material and water, as well as en organisms.*	*During this activity, each student should:* *--move energy, water, and food symbols from one component to another in a food chain* *--demonstrate an understanding of energy and matter transfer by correctly completing Worksheet 4-2.*
ration:	Students should:
dom order on the chalkboard tray the flash ed in the materials column. Ask for a teer to arrange the cards into one food ilizes every card.	--arrange the seven cards into the following food chain: Hawk ⟶ Snake ⟶ Frog ⟶ Mosquito ⟶ Man Cow ⟶ Grass.
food chain on the chalkboard tray and say: E WE TALKING ABOUT YESTERDAY THAT MOVED FOOD TO ANOTHER IN A FOOD CHAIN? CONTAINS ENERGY.	--recall from Activity 4-1 and respond, "Energy."
nergy symbol and say: SE THIS SYMBOL TO REPRESENT THE ENERGY I'M PLACING THIS SYMBOL FOR ENERGY RASS. (Student's name), MOVE THE YMBOL TO WHERE THE ENERGY GOES NEXT FOOD CHAIN.	--move the energy symbol to the cow.
dent has correctly placed the symbol on the	
's name), HOW DOES THE COW GET THE	--reply, "It eats the grass."

INVOLVE YOUR SLOWEST STUDENTS

MATERIALS

Food symbol



TEACHING STRATEGIES

Continue in the same manner, giving other students the opportunity to move the energy symbol and to answer what the direct energy source is. Proceed until several students have had the chance to move the symbol. Then say:

> WE'VE JUST SEEN THAT ENERGY IS PASSED ALONG FROM ONE LIVING THING TO ANOTHER. ARE THERE ANY OTHER THINGS BESIDES ENERGY THAT ARE PASSED ALONG IN A FOOD CHAIN?

If food is given as an answer, ask:

> WHAT IS THE FOOD THAT PLANTS MAKE?

> If the students do not recall, refer to the activities in Unit III, Core D. Then hold up the food symbol, and say:
>
> I WILL USE THIS SYMBOL TO REPRESENT THE FOOD THAT PLANTS MAKE.

Place the food symbol on the grass.

> (Student's name), MOVE THE FOOD SYMBOL TO WHERE IT PASSES AFTER IT LEAVES THE PLANT.
>
> FOOD IS PASSED ALONG. HOW COULD A COW GET FOOD FROM A PLANT?
>
> (Student's name), MOVE THE FOOD SYMBOL TO WHERE THE FOOD WOULD GO NEXT IN THE FOOD CHAIN.
>
> HOW CAN THE MAN GET THE FOOD THAT WAS ONCE A PART OF THE PLANT?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
same manner, giving other students the ove the energy symbol and to answer what y source is. Proceed until several d the chance to move the symbol. Then	Students should:
SEEN THAT ENERGY IS PASSED ALONG FROM THING TO ANOTHER. ARE THERE ANY OTHER DES ENERGY THAT ARE PASSED ALONG IN N?	--respond, "Food," "Water," "I don't know."
as an answer, ask:	
FOOD THAT PLANTS MAKE?	--recall that sugar is the end product of photosynthesis.
students do not recall, refer to the ties in Unit III, Core D. Then hold food symbol, and say:	
USE THIS SYMBOL TO REPRESENT THE HAT PLANTS MAKE.	
ymbol on the grass.	
name), MOVE THE FOOD SYMBOL TO WHERE FTER IT LEAVES THE PLANT.	--move the food symbol to the cow.
SED ALONG. HOW COULD A COW GET FOOD T?	--reply, "Eat the plant."
name), MOVE THE FOOD SYMBOL TO WHERE ULD GO NEXT IN THE FOOD CHAIN.	--inspect the chain and move the food symbol to the man.
MAN GET THE FOOD THAT WAS ONCE A PLANT?	--reply, "Eat the cow (hamburger, steak)."

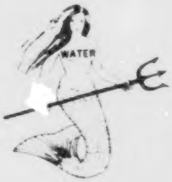
MATERIALS

TEACHING STRATEGIES

Continue the strategy in a similar manner and again give a variety of students the opportunity to participate. Then set up another chain and say:

> FOOD IS NOT THE ONLY MATERIAL THAT IS PASSED FROM ONE LINK TO ANOTHER ALONG A CHAIN. WATER MOVES THROUGH THE CHAIN TOO.

Water symbol



Now hold up the water symbol and say:

> WHO WOULD LIKE TO SHOW US HOW THIS WATER SYMBOL WOULD GET FROM ONE END OF THE CHAIN TO THE OTHER?

Let volunteer move the water symbol through the food chain.

Conclude by saying:

> WE HAVE LEARNED, THEN, THAT THREE KINDS OF THINGS ARE PASSED FROM ONE PART OF THE FOOD CHAIN TO THE OTHER. NAME THE THREE THINGS.

Write student responses on the chalkboard. Then say:

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
strategy in a similar manner and again give students the opportunity to participate. nother chain and say: NOT THE ONLY MATERIAL THAT IS PASSED LINK TO ANOTHER ALONG A CHAIN. WATER ROUGH THE CHAIN TOO.	Students should:
he water symbol and say: D LIKE TO SHOW US HOW THIS WATER OULD GET FROM ONE END OF THE CHAIN THER? move the water symbol through the food	--place the water symbol on the plant (at the end of the chain) and move it from link to link. While doing so they should indicate their understanding by making statements similar to, "The water from the corn is transferred to the mouse when it eats the corn, and then on to the snake when the snake eats the mouse, and finally to the hawk when the hawk eats the snake."
ying: EARNED, THEN, THAT THREE KINDS OF E PASSED FROM ONE PART OF THE FOOD THE OTHER. NAME THE THREE THINGS. responses on the chalkboard. Then say:	--respond, "Energy," "Food," and "Water."

HAVE YOU INVOLVED ALL STUDENTS?

MATERIALS

TEACHING STRATEGIES

FOOD CONTAINS MANY THINGS. WHAT WERE SOME OF THE THINGS WE LEARNED ABOUT EARLIER THIS YEAR THAT ARE IN FOOD?

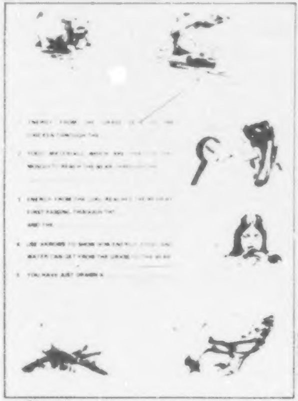
FOOD CONTAINS SUGARS, VITAMINS, MINERALS, AND OTHER BODY-BUILDING MATERIALS.

Then say:

WHEN FOOD IS PASSED ALONG A FOOD CHAIN, THEN ALL OF THESE THINGS ARE PASSED, TOO, AS PART OF THE FOOD.

CLUES TO

Worksheet 4-2



Distribute Worksheet 4-2. Direct the students' attention to the pictures on the worksheet, and say:

LOOK AT THE PICTURES ON YOUR WORKSHEET.

WHAT IS SHOWN IN A?

WHAT IS SHOWN IN B?

WHAT IS SHOWN IN C?

WHAT IS SHOWN IN D?

WHAT IS SHOWN IN E?

WHAT IS SHOWN IN F?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
NS MANY THINGS. WHAT WERE SOME OF NE LEARNED ABOUT EARLIER THIS YEAR FOOD?	--recall, "Protein," "Vitamins," "Minerals," "Don't know."
NS SUGARS, VITAMINS, MINERALS, AND BUILDING MATERIALS.	
PASSED ALONG A FOOD CHAIN, THEN THINGS ARE PASSED, TOO, AS PART	

CLUES TO SUCCESS

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
eet 4-2. Direct the students' attention n the worksheet, and say:	
PICTURES ON YOUR WORKSHEET.	
N IN A?	--respond, "A bear eating a fish."
N IN B?	--respond, "A fish eating the mosquito."
N IN C?	--respond, "A mosquito biting a girl."
N IN D?	--respond, "A girl eating the chicken leg."
N IN E?	--respond, "A chicken eating the caterpillar."
N IN F?	--respond, "A caterpillar eating the grass."

ACTIVITY
4-2

MATERIALS

Slide 4-3, Worksheet 4-2

TEACHING STRATEGIES

As students describe each picture have them assist in spelling as you write on the chalkboard:

A. "Bear"
B. "Fish"
C. "Mosquito"
D. "Girl"
E. "Chicken"
F. "Caterpillar"

Elicit student responses until all pictures have been identified. Then say:

> NOW I'LL READ THE SENTENCES AND YOU CHOOSE A WORD FROM THIS LIST (point to list) TO FILL IN EACH BLANK. DON'T TELL ANYONE ELSE WHAT YOU WROTE. WHEN EVERYONE HAS WRITTEN IN ALL THE WORDS WE WILL TALK ABOUT YOUR ANSWERS.

Read each sentence, pausing long enough for each student to write in his answer.

When all the students are finished, collect the worksheets. Now project Slide 4-3 and again read each statement and have students tell and discuss their answers.

Tally and record worksheet results on Tallysheet 4-1. To record student responses, turn to the Understanding section of the Student Record of Progress. These items assess an understanding of the movement of materials and energy through food chains. In the column headed "Activity 4-2 Transfer Concept," circle a number from 0 through 5 to indicate the degree of success on this

TEACHING STRATEGIES

scribe each picture have them assist in
u write on the chalkboard:

"
"
uito"
"
ken"
rpillar"

responses until all pictures have been
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READ THE SENTENCES AND YOU CHOOSE A
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ow project Slide 4-3 and again read each
have students tell and discuss their

HAVE YOU
INVOLVED
ALL
STUDENTS?

rd worksheet results on Tallysheet 4-1.
ent responses, turn to the Understanding
Student Record of Progress. These items
rstanding of the movement of materials and
food chains. In the column headed
Transfer Concept," circle a number from 0
ndicate the degree of success on this

ANTICIPATED STUDENT BEHAVIORS

MATERIALS

TEACHING STRATEGIES

worksheet. Note whether students who had difficulty with food chains in Activity 4-1 have now grasped this concept. Decide at this point whether to play the Food Chain Game and use some Change of Pacers to develop this concept further, or to go on to Activity 4-3.

NOTE: If a student's paper indicates a problem with the activity or the worksheet, send it in to BSCS with your comments

Send in Tallysheet 4-1.

TEACHING STRATEGIES

e whether students who had difficulty s in Activity 4-1 have now grasped this e at this point whether to play the Food use some Change of Pacers to develop this , or to go on to Activity 4-3.

dent's paper indicates a problem with vity or the worksheet, send it in to h your comments.

Tallysheet 4-1.

ANTICIPATED STUDENT BEHAVIORS

Upon completion of this activity, each student should, as a minimum:

- *--be able to move food, water, and energy symbols through a food chain*
- *--be able to state that energy, food, and water are transferred along a food chain*
- *--have listed the links in the food chains on Worksheet 4-2.*

UNIT IV, CORE A
ACTIVITY 4-2

Activity name suggested by class:

Teacher____________________

BSCS USE: Post___ Tally___ Rev___

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile ☐ Of value--needs the ☐ Worth salvaging--make ☐ Worthless

BSCS Evaluation: EMH Feedback Form 1d

Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is
☐ Of value--needs the revision suggested
☐ Worth salvaging--make major changes described
☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s)______________ Comment:

Specific Questions:

12. Did any student identify sugar as the food plants make? ☐ No ☐ Yes Who?
Comment:

13. Do you feel that most students understood the idea that energy and matter move from one living thing to another? ☐ Yes ☐ No Comment:

14. Send in Tallysheet 4-1.

Side A

Teacher ______________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

BSCS Evaluation: EMH Feedback Form 1d

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff (we will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

FOCUS FOR THIS ACTIVITY

CONTENT

Unit Goals for the Student:

1. Develop an understanding of the flow of energy through the living world.

2. Develop an understanding of cycling and appreciate the cycling relationship of the materials and organisms in the environment.

5. Comprehend the role of man as an integral part *of* nature not apart *from* nature.

Core A Objectives for the Student:

1. Reconstruct the transfer of energy, food, and water through environmental systems.

2. Recognize the existence and importance of interrelationships between plants and animals as a result of eating and being eaten.

ENVIRONMENTAL THEME:
Interrelationships of Environmental Components, Diversity and Patterns, Flow of Energy.

INQUIRY SKILLS:
Observing, Associating

PROBLEM-SOLVING SKILLS:
Knowing Question and Task

PRACTICAL APPLICATION:
Reading a Story for Meaning, Importance of Protein for a Balanced Diet

TIVITY

als for the Student:

Develop an understanding of the flow of energy through the living world.

Develop an understanding of cycling and appreciate the cycling relationship of the materials and organisms in the environment.

Comprehend the role of man as an integral part of nature not apart from nature.

Objectives for the Student:

Reconstruct the transfer of energy, food, and water through environmental systems.

Recognize the existence and importance of interrelationships between plants and animals as a result of eating and being eaten.

L THEME:
lationships of Environmental Components,
ty and Patterns, Flow of Energy.

LS:
ng, Associating

ING SKILLS:
Question and Task

PLICATION:
a Story for Meaning, Importance of
for a Balanced Diet

BSCS

UNIT IV.	TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT
CORE A.	ENERGY AND MATERIAL TRANSFER
ACTIVITY 4-3.	THE LONG JOURNEY: A REVIEW

ACTIVITY
4-3

MATERIALS

Booklet, *The Long Journey*

The Long Journey

TEACHING STRATEGIES

Activity 4-3. The Long Journey: A Review

This activity, in story form, traces the flow of food matter through food chains, of which the student is a part.

Begin by distributing the booklet, *The Long Journey.*

Say:

> WE'VE TALKED OF HOW THE MATERIALS THAT MAKE UP FOOD PASS FROM ONE PART OF THE FOOD CHAIN TO ANOTHER. NOW WE ARE GOING TO READ A STORY ABOUT HOW SOME FOOD GOT TO BE A PART OF YOUR BODY.

NOTE: The booklets are designed to be read aloud by the teacher as students follow along. Assist students, especially with vocabulary, and give them a chance to discuss each page. Go through the booklet very slowly, making sure every student understands the idea on each page before going on to the next. Encourage students who get the ideas quickly to help explain the ideas to others.

Below are some specific suggestions and information for various pages in the booklet. Use your discretion on which of this information should be relayed to the students.

Page 2. Give students a chance to answer this question before continuing.

Page 3. Make sure students understand that the picture is not realistic.

Page 5. Body building material here is really nitrogen. Do not mention this unless students ask because it will probably just confuse them.

TEACHING STRATEGIES

. The Long Journey: A Review

y, *in story form, traces the flow of food*
gh *food chains, of which the student is a*

tributing the booklet, *The Long Journey*.

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uing.

sure students understand that the picture
tic.

building material here is really nitrogen.
n this unless students ask because it will
confuse them.

ANTICIPATED STUDENT BEHAVIORS

During this activity, each student should:

--*read the booklet*, The Long Journey
--*demonstrate his understanding of the movement of matter in the environment by tracing a food particle through food chains.*

FOCUS FOR THIS ACTIVITY

CONTENT

Unit Goals for the Student:

1. Develop an understanding of the flow of energy through the living world.
2. Develop an understanding of cycling and appreciate the cycling relationship of the materials and organisms in the environment.
5. Comprehend the role of man as an integral part _of_ nature not apart _from_ nature.

Core A Objectives for the Student:

1. Reconstruct the transfer of energy, food, and water through environmental systems.
2. Recognize the existence and importance of interrelationships between plants and animals as a result of eating and being eaten.

ENVIRONMENTAL THEME:

Interrelationships of Environmental Components, Diversity and Patterns, Flow of Energy.

INQUIRY SKILLS:

Observing, Associating

PROBLEM-SOLVING SKILLS:

Knowing Question and Task

PRACTICAL APPLICATION:

Reading a Story for Meaning, Importance of Protein for a Balanced Diet

CTIVITY

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. Develop an understanding of the flow of energy through the living world.

. Develop an understanding of cycling and appreciate the cycling relationship of the materials and organisms in the environment.

. Comprehend the role of man as an integral part of nature not apart from nature.

Objectives for the Student:

. Reconstruct the transfer of energy, food, and water through environmental systems.

. Recognize the existence and importance of interrelationships between plants and animals as a result of eating and being eaten.

AL THEME:
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LLS:
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VING SKILLS:
g Question and Task

PPLICATION:
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n for a Balanced Diet

BSCS

UNIT IV.	TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT
CORE A.	ENERGY AND MATERIAL TRANSFER
ACTIVITY 4-3.	THE LONG JOURNEY: A REVIEW

MATERIALS

TEACHING STRATEGIES

Page 6. Give students a chance to answer this question before continuing.

Page 8. Nitrogen makes up about four-fifths of the air.

Page 9. Only a very small part of the nitrogen is washed into the soil.

Page 10. Microbes in the clover root catch the nitrogen and change it so that the plant can use it.

Page 11. The nitrogen is a part of the protein in the clover leaf.

Pages 12, 13, and 14. Digestion is described more fully on Pages 17, 20, and 21. Elaborate here only if students request it.

Page 15. What passed through the hawk was not digested (broken down).

Page 16. Microbes usually break down the droppings before the nitrogen reaches the plants again, but this need not be explained until after the students have learned about decomposers.

Page 17. Students may not know that the stomach makes digestive juices that break up the grass. One of these juices is acid.

Page 18. Write the word "protein" on the board so that students become familiar with the word. It is a word they will meet in relation to diets and foodstuffs.

Page 19. If necessary, emphasize that the meat we eat is really muscle.

Page 21. Students might need some discussion of the anatomy here.

TEACHING STRATEGIES

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ng.

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soil.

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ANTICIPATED STUDENT BEHAVIORS

ACTIVITY
4-3

MATERIALS

TEACHING STRATEGIES

Page 22. Explain that this picture shows the root of a hair, with the hair sticking out of the skin, and a blood vessel bringing blood to the root. You may also need to explain that one of the things blood does is carry food to all parts of the body.

Page 23. This is an appropriate place to discuss the importance of protein to our diet. Discuss that we need protein every day to build or repair our bodies. Discuss the foods that give us protein (meat, fish, eggs, cheese, milk, and to some extent beans).

Page 24. At this time students will not be able to answer this question. However, they might speculate about any possible continuations of the long journey (e.g., clothes moth eating hair). *The Long Journey* will be referred to again when students know about decomposers, and they will realize that microbes will break down the hair after the person has died, and the body building material will go back into the soil to be used again by plants.

After reading the booklet, ask students to draw two food chains found in *The Long Journey*. When they have had time to complete their own food chains, discuss the chains and have some students draw them on the chalkboard. These can be connected to go all the way from air to themselves. The two food chains in *The Long Journey* are the chain from clover to hawk:

clover ⟶ grasshopper ⟶ frog ⟶ snake ⟶ hawk

and the chain from grass to themselves:

grass ⟶ cow ⟶ me.

Then these chains can be linked by the other steps in *The Long Journey* from the air to themselves. To link the two food chains, add ⟶ hawk (dropping ⟶ between hawk and grass.

TEACHING STRATEGIES

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→ grasshopper → frog → snake → hawk

from grass to themselves:

cow → me.

ins can be linked by the other steps in y from the air to themselves. To link the s, add → hawk (dropping → between hawk

ANTICIPATED STUDENT BEHAVIORS

MATERIALS

TEACHING STRATEGIES

Air and ground can then be added at the front of the chain, beginning with clover, to show where the body building material in themselves originally came from:

air ⟶ ground ⟶ clover.

Remind students that plants make their own food and use things from the air and ground to do so.

When you feel students understand the sequence from the air to themselves, place an arrow before the word "air" and after the word "me." Refer them to the last page in *The Long Journey* and ask them what these arrows might mean.

TEACHING STRATEGIES

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with clover, to show where the body
in themselves originally came from:

nd → clover.

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ir and ground to do so.

dents understand the sequence from the
place an arrow before the word "air"
d "me." Refer them to the last page in
and ask them what these arrows might

ANTICIPATED STUDENT BEHAVIORS

Students should:

--respond, "The journey keeps going," "Something happens to me when I die," "The stuff in the air probably came from somewhere else."

Upon completion of this activity, ***each student*** *should, as a minimum:*

--be able to trace the movement of "body building material" through food chains.

UNIT IV, CORE A
ACTIVITY 4-3

Activity name suggested by class:

Teacher____________________

BSCS USE: Post___ Tally___ Rev___

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile ☐ Of value--needs the ☐ Worth salvaging--make ☐ Worthless

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is
☐ Of value--needs the revision suggested
☐ Worth salvaging--make major changes described
☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s)______________ Comment:

Specific Questions:

12. Could students trace body building material through a food chain?

Teacher ____________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

BSCS Evaluation: EMH Feedback Form 1d

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff (we will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

1. Develop an understanding of the flow of energy through the living world.

2. Develop an understanding of cycling and appreciate the cycling relationship of the materials and organisms in the environment.

5. Comprehend the role of man as an integral part of nature not apart from nature.

Core A Objectives for the Student:

1. Reconstruct the transfer of energy, food, and water through environmental systems.

2. Recognize the existence and importance of interrelationships between plants and animals as a result of eating and being eaten.

ENVIRONMENTAL THEME:

Interrelationships of Environmental Components, Diversity and Patterns, Flow of Energy

INQUIRY SKILLS:

Identifying, Associating, Predicting

PROBLEM-SOLVING SKILLS:

Organizing Data

PRACTICAL APPLICATION:

Working in a Group, Following Instructions, Respect for Nature

CTIVITY

oals for the Student:

. Develop an understanding of the flow of energy through the living world.

. Develop an understanding of cycling and appreciate the cycling relationship of the materials and organisms in the environment.

. Comprehend the role of man as an integral part of nature not apart from nature.

Objectives for the Student:

. Reconstruct the transfer of energy, food, and water through environmental systems.

. Recognize the existence and importance of interrelationships between plants and animals as a result of eating and being eaten.

AL THEME:
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PPLICATION:
in a Group, Following Instructions,
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BSCS

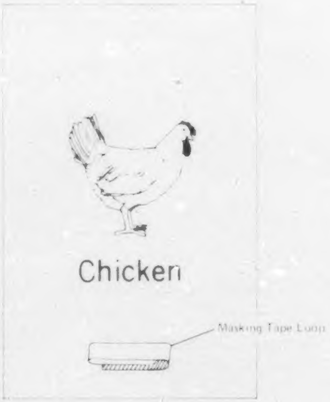
UNIT IV.	TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT
CORE A.	ENERGY AND MATERIAL TRANSFER
ACTIVITY 4-4.	FOOD WEBS

ACTIVITY
4-4

MATERIALS

1 Deck of Food Web flash cards
*Scissors
*Yarn, 6-8 balls of different colors
*Tape, masking or hook Velcro

Diagram 4-1



*Not furnished in materials kit

TEACHING STRATEGIES

Activity 4-4. Food Webs

The transfer of energy and materials is now expanded into the context of the food web. Students will be given the opportunity to review the concepts associated with food webs that were presented in Unit III.

Teacher Preparation:

1. Move desks and chairs to prepare an open area in the classroom where the flash cards can be arranged on the floor in a circle ten or twelve feet in diameter. (The gym floor, open space in the library, a large hallway, or any other similar area could also be used.)

2. While all the flash cards are appropriate to use, it is recommended that the bird, turtle, spider, and fish cards be removed from the deck prior to the start of this activity since very few chains can be constructed using these cards.

3. At the bottom of each card attach a flattened loop of masking tape so that a two- or three-inch strip of the sticky side of the tape is facing up. This strip should be centered below the name appearing on the front of each card. (See Diagram 4-1.) Alternatively, a piece of Velcro (hook side) can be stuck on the card.

Begin this activity by distributing one or more flash cards to each student and having them arrange the cards on the floor in a circle, ten to twelve feet in diameter. Names on the cards should face the center of the circle. Have students stand around the outside of the circle behind one of the animal cards.

Begin the activity by selecting one of the students to construct a food chain while the others watch.

TEACHING STRATEGIES

. Food Webs

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cards should face the center of the circle.
s stand around the outside of the circle
f the animal cards.

tivity by selecting one of the students to
food chain while the others watch.

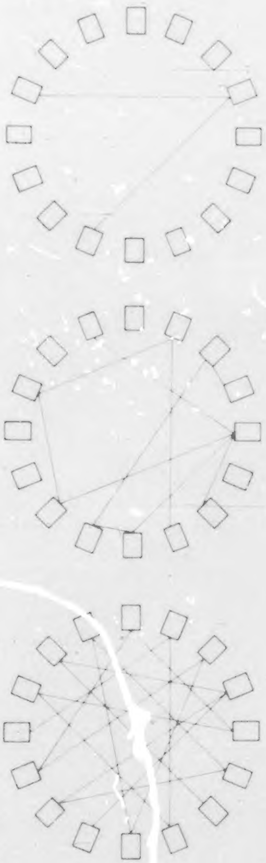
ANTICIPATED STUDENT BEHAVIORS

During this activity, each student should:

--participate in the food web yarn activity by constructing one or more food chains
--identify food chains and food webs
--realize that a disturbance in any part of the food web will ultimately be felt in the whole food web.

MATERIALS

Diagram 4-2



TEACHING STRATEGIES

IF YOU WERE A (name of animal chosen), WHAT OTHER LIVING THING WOULD YOU NORMALLY EAT?

Give a ball of yarn and scissors to the student making the food chain. Instruct him to attach the end of his yarn to the masking tape or Velcro on the card depicting the animal chosen. The yarn should then be stretched out and attached in the same manner to the animal's food source. Ask the student to identify a living thing that this food source might eat. If the student cannot identify a food source, have the class help him. When a food source is identified, have him stretch and attach the yarn to the new food source. Continue identifying food sources until a plant is reached. Then instruct the student to cut the yarn. (See Diagram 4-2.) At this point, ask:

WHAT HAVE YOU MADE?

WHAT DOES THE PIECE OF YARN REPRESENT?

Select another student to start a new food chain. Any card can be used more than once. Challenge them to make the chains as long as possible. Continue with this procedure until a maze of yarn is created between the cards. Care must be taken in attaching yarn to the cards so that the cards do not become scattered. If a different color yarn is used for each food chain, it will be easier for students to distinguish between the chains.

Then ask:

WHAT DOES EACH COLOR OF YARN STAND FOR?

HOW MANY FOOD CHAINS DID WE MAKE?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
A (name of animal chosen), WHAT G THING WOULD YOU NORMALLY EAT?	--recall the Food Chain Game and identify what they would normally eat.
arn and scissors to the student making Instruct him to attach the end of his ing tape or Velcro on the card depicting n. The yarn should then be stretched out the same manner to the animal's food student to identify a living thing ource might eat. If the student cannot source, have the class help him. When a dentified, have him stretch and attach new food source. Continue identifying il a plant is reached. Then instruct ut the yarn. (See Diagram 4-2.) At	
DU MADE?	--respond, "Food chain."
HE PIECE OF YARN REPRESENT?	--respond, "Food chain," "Food going from one thing to another."
tudent to start a new food chain. Any more than once. Challenge them to make ng as possible. Continue with this a maze of yarn is created between the be taken in attaching yarn to the cards do not become scattered. If a yarn is used for each food chain, it or students to distinguish between the	
CH COLOR OF YARN STAND FOR?	--respond, "A food chain."
D CHAINS DID WE MAKE?	--respond, "Lots," "A bunch."

ACTIVITY
4-4

MATERIALS

TEACHING STRATEGIES

WHAT DO ALL THE CRISSCROSSING LINES REMIND YOU OF?

If students do not suggest that the crisscrossing lines suggest a web, ask:

WHAT DOES A SPIDER MAKE?

WHAT WOULD BE A GOOD NAME FOR WHAT WE HAVE MADE?

Then say:

A GROUP OF FOOD CHAINS CONNECTED TOGETHER IS CALLED A FOOD WEB. (Write "Food Web" on the chalkboard.) WHY DO YOU THINK IT'S CALLED A FOOD WEB?

WHAT'S THE DIFFERENCE BETWEEN A FOOD WEB AND A FOOD CHAIN?

Ask the students once again to stand behind a card. Make up a disastrous situation involving one of the animals represented on the cards. Try to involve an animal that has many strings attached to its card.

The situation should be as lifelike as possible. Examples might be: a drought hits an area and wipes out all the grain for a year; hunters shoot all of the hawks in an area; an insecticide kills all of the mosquitoes; all of the deer die of a mysterious disease, and so forth.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
ALL THE CRISSCROSSING LINES REMIND	--respond, "A web," "A mess," "Everything is tangled up."
students do not suggest that the criss- ssing lines suggest a web, ask:	
T DOES A SPIDER MAKE?	--respond, "Spiders make webs."
T WOULD BE A GOOD NAME FOR WHAT WE E MADE?	--associate a spider web with the class activity and respond, "Food web."
OF FOOD CHAINS CONNECTED TOGETHER IS FOOD WEB. (Write "Food Web" on the rd.) WHY DO YOU THINK IT'S CALLED A ?	--respond, "Because it looks like a spider's web."
HE DIFFERENCE BETWEEN A FOOD WEB AND HAIN?	--compare the two and indicate that a food web shows many food chains and how they are connected. Respond with statements such as, "A web is many food chains."
nts once again to stand behind a card. Make us situation involving one of the animals n the cards. Try to involve an animal that ngs attached to its card.	
should be as lifelike as possible. t be: a drought hits an area and wipes rain for a year; hunters shoot all of the rea; an insecticide kills all of the ll of the deer die of a mysterious disease,	

MATERIALS

TEACHING STRATEGIES

After describing the disaster to the students, have the student who is standing by that card kneel and lift his card about a foot off the floor. Then have all of the students standing behind the cards that are directly affected by the lifted card kneel and raise their cards. Then have all those that are affected by the second movement kneel and raise their cards, and so forth. The yarns should be so interconnected that all or nearly all of the students will have been affected by the raising of the cards.

Say:

> REMEMBER, EACH PLANT OR ANIMAL CARD STANDS FOR ALL OF THAT KIND OF PLANT OR ANIMAL IN ONE BIG AREA.

Discuss the disaster you chose to take place in a manner similar to the strategy below, substituting different animal and plant names where necessary.

> WHAT WOULD HAPPEN TO OUR FOOD WEB IF THE GRASSES WERE DESTROYED OR RUINED?
>
> DEER EAT GRASSES. WHAT WOULD HAPPEN IF ALL THE DEER DIED?
>
> IF THE DEER WERE GONE, WHAT WOULD THE MOUNTAIN LION EAT?
>
> HOW MANY RABBITS DO YOU THINK THE LION WOULD NEED TO EAT TO EQUAL ONE DEER?
>
> IF THE MOUNTAIN LION STARTS EATING UP ALL THE RABBITS WHAT WILL THE HAWK DO?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
the disaster to the students, have the tanding by that card kneel and lift his t off the floor. Then have all of the g behind the cards that are directly lifted card kneel and raise their cards. ose that are affected by the second nd raise their cards, and so forth. The so interconnected that all or nearly all will have been affected by the raising of	
ACH PLANT OR ANIMAL CARD STANDS FOR KIND OF PLANT OR ANIMAL IN ONE BIG	
ster you chose to take place in a manner trategy below, substituting different names where necessary.	
HAPPEN TO OUR FOOD WEB IF THE E DESTROYED OR RUINED?	--respond, "Some animals would go hungry," "Some animals would die," "Many animals would suffer."
ASSES. WHAT WOULD HAPPEN IF ALL THE	--respond, "People couldn't hunt any more," "The mountain lion would get hungry."
WERE GONE, WHAT WOULD THE MOUNTAIN	--look at the food web and respond, "Rabbits," "Mice," "Cows."
BITS DO YOU THINK THE LION WOULD TO EQUAL ONE DEER?	--respond, "Lots," "A whole bunch."
AIN LION STARTS EATING UP ALL WHAT WILL THE HAWK DO?	--respond, "Eat something else," "Eat more mice or snakes."

ACTIVITY
4-4

MATERIALS

TEACHING STRATEGIES

WHAT DOES THE FARMER OR RANCHER GROW THAT THE MOUNTAIN LION MIGHT EAT INSTEAD OF THE DEER?

HOW WOULD THIS AFFECT THE FARMER?

FROM WHAT YOU HAVE LEARNED ABOUT FOOD WEBS DO YOU THINK ANIMALS CAN LIVE ALL BY THEMSELVES?

Depending on the interest and understanding of your students, you may wish to select another animal and "eliminate" it through a disaster. Follow through with the effects this will have on other living things in the web.

Continue by asking:

ARE PEOPLE IN FOOD WEBS?

HOW ARE WE AFFECTED IF SOMETHING HAPPENS TO OTHER LIVING THINGS IN OUR FOOD WEB?

COULD PEOPLE LIVE WITHOUT OTHER PLANTS AND ANIMALS IN THEIR ENVIRONMENT?

WHY NOT?

See Change of Pacers 4 and 5.

CHANGE

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
ES THE FARMER OR RANCHER GROW THAT THE N LION MIGHT EAT INSTEAD OF THE DEER?	--respond, "Cows," "Chickens," "Pigs."
LD THIS AFFECT THE FARMER?	--infer, "He might go hungry," "Go broke," "He'd get mad."
AT YOU HAVE LEARNED ABOUT FOOD WEBS DO NK ANIMALS CAN LIVE ALL BY THEMSELVES?	--conclude that the living things they have studied depend on one another and respond, "No."
the interest and understanding of your stu- ay wish to select another animal and "elimin- ugh a disaster. Follow through with the will have on other living things in the web.	
asking:	
PLE IN FOOD WEBS?	--respond, "Yes."
WE AFFECTED IF SOMETHING HAPPENS TO IVING THINGS IN OUR FOOD WEB?	--infer, "We'd have less to eat," "We'd have to eat other things," "We wouldn't be able to use animals for as many things."
OPLE LIVE WITHOUT OTHER PLANTS AND IN THEIR ENVIRONMENT?	--respond, "No."
	--respond, "We need other living things for our food, clothing, and other things."
	Upon completion of this activity, each student should, as a minimum: *--have helped to construct one or more food chains using the yarn and the plant and animal flash cards* *--be able to state that all living things depend on each other.*
Pacers 4 and 5.	

CHANGE OF PACER

UNIT IV, CORE A
ACTIVITY 4-4

Activity name suggested by class:

Teacher ____________________

BSCS USE: Post___ Tally___ Rev___

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile ☐ Of value--needs the ☐ Worth salvaging--make ☐ Worthless

BSCS Evaluation: EMH Feedback Form 1d

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

11. Your rating of this activity:

☐ Worthwhile --keep as is	☐ Of value--needs the revision suggested	☐ Worth salvaging--make major changes described	☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s)______________ Comment:

Specific Questions:

12. Could most students distinguish the difference between food chain and food web?
☐ Yes ☐ No Comment:

13. Were the effects of a disaster (like a drought) on a food web understood by most students? ☐ Yes ☐ No

Side A

Teacher ______________________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

BSCS Evaluation: EMH Feedback Form 1d

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff (we will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

1. Develop an understanding of the flow of energy through the living world.

5. Comprehend the role of man as an integral part of nature not apart from nature.

Core A Objectives for the Student:

1. Reconstruct the transfer of energy, food, and water through environmental systems.

2. Recognize the existence and importance of interrelationships between plants and animals as a result of eating and being eaten.

ENVIRONMENTAL THEME:

Interrelationships of Environmental Components, Diversity and Patterns

INQUIRY SKILLS:

Observing, Identifying, Associating

PROBLEM-SOLVING SKILLS:

Recording Data, Discussion and Treatment of Group Data

PRACTICAL APPLICATION:

Working in Groups, Practicing Good Manners

TIVITY

als for the Student:

Develop an understanding of the flow of energy through the living world.

Comprehend the role of man as an integral part of nature not apart from nature.

Objectives for the Student:

Reconstruct the transfer of energy, food, and water through environmental systems.

Recognize the existence and importance of interrelationships between plants and animals as a result of eating and being eaten.

THEME:
lationships of Environmental Components,
ty and Patterns

LS:
g, Identifying, Associating

NG SKILLS:
g Data, Discussion and Treatment of
ta

LICATION:
in Groups, Practicing Good Manners

BSCS

UNIT IV.	TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT
CORE A.	ENERGY AND MATERIAL TRANSFER
ACTIVITY 4-5.	FOOD WEBS IN MY COMMUNITY

ACTIVITY
4-5

MATERIALS

*Clipboard

*Not furnished in materials kit

TEACHING STRATEGIES

Activity 4-5. Food Webs in My Community

This activity will introduce/reacquaint students with some plants and animals in their area. They will be given more practice building food webs. This time, however, students will be working with plants and animals within their own community. Because the plants and animals will be familiar to the students, this food web will provide a more concrete model than the previous one.

Teacher Preparation:

Prior to this activity you will want to locate a convenient outdoor place where you can take your class for this field trip. It should be as rich in plant and animal life as possible. A place within easy walking distance is preferable. Caution the students not to destroy unnecessarily any plants or animals in the place visited.

Selection of a zoo or science museum as an alternate place to visit will defeat the intended purpose of the activity, since the majority of animals and plants present there are unlikely to be representative of the local area.

Begin this activity by asking:

> IF WE WANTED TO TAKE A SHORT TRIP TO FIND A LOT OF PLANTS AND ANIMALS, WHERE COULD WE GO?

As each place is suggested ask the following questions:

> WILL THERE BE A LOT OF PEOPLE THERE?

> WHO OWNS IT?

> HOW CAN WE GET PERMISSION TO VISIT THAT PLACE?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
. Food Webs in My Community *y will introduce/reacquaint students with some nimals in their area. They will be given more lding food webs. This time, however, students ing with plants and animals within their own Because the plants and animals will be the students, this food web will provide a e model than the previous one.*	*During this activity, each student should:* *--identify several plants and animals found in his area* *--recognize relationships of plants and animals in his area* *--supply to the teacher the names of several local plants and animals to be recorded on Tallysheet 4-2.*
aration: s activity you will want to locate a conve- r place where you can take your class for this It should be as rich in plant and animal life A place within easy walking distance is Caution the students not to destroy unneces- lants or animals in the place visited. a zoo or science museum as an alternate it will defeat the intended purpose of the nce the majority of animals and plants present likely to be representative of the local area. ctivity by asking:	Students should:
ANTED TO TAKE A SHORT TRIP TO FIND A LOT TS AND ANIMALS, WHERE COULD WE GO?	--respond by naming various places in their area.
e is suggested ask the following questions:	
ERE BE A LOT OF PEOPLE THERE?	--respond with such comments as, "Maybe," "Yes," "No."
S IT?	--respond, "City," "Somebody," "I don't know," "The mayor."
WE GET PERMISSION TO VISIT THAT PLACE?	--respond with statements such as, "Talk to the owner," "Call the person that owns it," "Ask at the mayor's office."

MATERIALS	TEACHING STRATEGIES

Discuss all the various areas that could be visited and eventually arrive at as much of a universal agreement as is possible. Try not to dictate the spot - let students discuss the problem and weigh all the considerations.

Then say:

> WHEN WE VISIT THE (place) WHAT KINDS OF PLANTS AND ANIMALS DO YOU THINK WE WILL FIND?

As students make suggestions, write them on the chalkboard in two columns - "Plant" and "Animal." If there is any confusion about what is plant or animal, it should be clarified at this time. Students may not think of a fish, a bird, or an insect as an animal, for example. If this problem arises, it would be a good time to review the grouping work done earlier in Unit I.

If the space on the chalkboard is not needed, leave the list of plants and animals on the chalkboard until after the trip. If the space is needed, have a student copy the list for a permanent record, to be referred to later.

The Day of the Field Trip:

If the weather is bad, postpone the field trip and see Activity 4-6 for an alternate lesson.

Briefly review with the students the conduct you expect from them on the field trip.

NOTE: Students should be paired for the trip. Tell each group (pair) to identify for you at least three plants and three animals from the area. Direct them to tell you the name of each organism and whether or not it is a plant or an animal. If you question the presence of the living thing, ask to see it or indicate evidence of it. Encourage

TEACHING STRATEGIES

various areas that could be visited and
e at as much of a universal agreement as
y not to dictate the spot - let students
lem and weigh all the considerations.

IT THE (place) WHAT KINDS OF PLANTS
DO YOU THINK WE WILL FIND?

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on the presence of the living thing, ask
or indicate evidence of it. Encourage

ANTICIPATED STUDENT BEHAVIORS

Students should:

--guess some of the plants and animals they expect to find in the area visited.

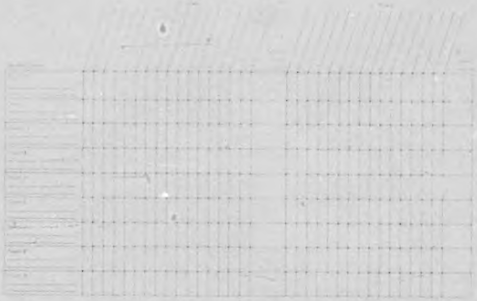
MATERIALS

TEACHING STRATEGIES

students to wander around and find as many living things as possible. Also, urge students to collect indirect evidence such as a feather, a bone, hair, an acorn, a leaf, or tracks.

Record the names of the two students in each team on Tallysheet 4-2 and take it along on the field trip to check off plants and animals that each team finds. (The tallysheet may be attached to a clipboard for ease in writing.) If you must tell the student the name of the living thing, make an asterisk in the animal column for that team. (See Diagram 4-3.)

Diagram 4-3



Allow students to list duplicate organisms, but strive to obtain variety by asking them to bring in more names if they all select the same organisms.

Some teams may have difficulty supplying the specific names of animals, such as "robin" or "hawk", in which case you can use a group name as a category, such as "birds" or "bugs". The same will be true of plants.

When back inside the classroom, have students compare their predictions with their actual findings. Do this by writing on the chalkboard the list of plants and animals the students saw as they call them out to you. Place this list next to those listed before the field trip. Have students circle the names of any organisms which occur on one list but not on the other. (If some predicted before the field trip that a robin might be seen, but no robin was reported, circle robin.)

> WHY DIDN'T WE SEE ALL OF THE PLANTS AND ANINALS WE THOUGHT WE WOULD SEE?

TEACHING STRATEGIES

nts to wander around and find as many living
s as possible. Also, urge students to
ct indirect evidence such as a feather, a
hair, an acorn, a leaf, or tracks.

ames of the two students in each team on
-2 and take it along on the field trip to
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g thing, make an asterisk in the animal
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tions with their actual findings. Do this
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n one list but not on the other. (If some
fore the field trip that a robin might be
robin was reported, circle robin.)

'T WE SEE ALL OF THE PLANTS AND ANINALS
HT WE WOULD SEE?

ANTICIPATED STUDENT BEHAVIORS

Students should:

--respond, "I don't know," "Some were asleep," "Some were dead," "Some spend only part of their time there," "They were there but we just missed them," "We made a mistake."

MATERIALS

TEACHING STRATEGIES

WHAT LIVING THINGS DID WE FIND THAT WE DIDN'T EXPECT?

WHAT LIVING THINGS WERE REPORTED THE MOST?

Each plant and animal will now be discussed, and then used in making a food web. Distribute one 3 X 5 card to each student. Direct the students to write on his card the name of a specific plant or animal from the list. Then have students place cards on the bulletin board in a rough circle.

Begin the class discussion by pointing to a card.

Ask:

WHAT IS THIS (plant or animal) LIKE?

WHAT DOES IT EAT?

Or in case of a plant, ask:

WHAT EATS IT?

(Student's name) WILL YOU GO TO THE BULLETIN BOARD AND PLACE A STRING (YARN OR MASKING TAPE) TO CONNECT THE (animal) WITH THE PLANT IT EATS?

Continue the questioning and the student involvement until all plants and animals have been connected by at least one string. Throughout the discussion, emphasize the interdependency of living things on one another. When all organisms are connected, ask:

WHAT HAVE WE MADE ON THE BULLETIN BOARD?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
THINGS DID WE FIND THAT WE DIDN'T	--list the things circled in the field trip list.
THINGS WERE REPORTED THE MOST?	--identify the most common things observed during the trip.
nimal will now be discussed, and then food web. Distribute one 3 X 5 card Direct the students to write on his a specific plant or animal from the students place cards on the bulletin circle.	
discussion by pointing to a card.	
S (plant or animal) LIKE?	--respond according to the organisms specified.
T EAT?	
case of a plant, ask:	
ATS IT?	--respond by naming the food involved.
name) WILL YOU GO TO THE BULLETIN LACE A STRING (YARN OR MASKING NECT THE (animal) WITH THE PLANT	--connect the two organisms with yarn or tape.
tioning and the student involvement until imals have been connected by at least ughout the discussion, emphasize the f living things on one another. When connected, ask:	
MADE ON THE BULLETIN BOARD?	--respond, "Food web," "Food chain."

ACTIVITY
4-5

MATERIALS

TEACHING STRATEGIES

WHAT WOULD HAPPEN IF ALL OF THE (name of local plant or animal) WERE TO DISAPPEAR SUDDENLY?

Because of the lack of knowledge of the habits of all the local plant and animal life it may be difficult for some of the students to draw the proper inferences. Guide the discussion so the students conclude that if anything happens to one group of living things, one or more other groups is likely to be affected. For example, if no one feels that the disappearance of trees would affect animals, ask:

WHERE WOULD SQUIRRELS LIVE IF THERE WERE NO TREES? WHERE WOULD BIRDS BUILD THEIR NESTS?

IF ALL THE INSECTS WERE TO DISAPPEAR, WHAT WOULD BIRDS THAT EAT MOSTLY INSECTS EAT TO KEEP FROM STARVING?

IF ALL THE BIRDS THAT EAT INSECTS WERE TO DISAPPEAR SUDDENLY, WHAT WOULD HAPPEN TO THE NUMBER OF INSECTS?

Encourage students to suggest and discuss other living things whose disappearance would affect groups of living things.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
D HAPPEN IF ALL OF THE (name of local animal) WERE TO DISAPPEAR SUDDENLY?	--infer that if something happens to one group of living things, another group suffers.
lack of knowledge of the habits of all the d animal life it may be difficult for some s to draw the proper inferences. Guide the the students conclude that if anything group of living things, one or more s likely to be affected. For example, if hat the disappearance of trees would affect	
LD SQUIRRELS LIVE IF THERE WERE NO HERE WOULD BIRDS BUILD THEIR NESTS?	--recognize that trees have an effect and respond, "They wouldn't have a place to live," "They'd have to go someplace else."
E INSECTS WERE TO DISAPPEAR, WHAT DS THAT EAT MOSTLY INSECTS EAT TO STARVING?	--respond, "Eat seeds," "Eat something else or die."
E BIRDS THAT EAT INSECTS WERE TO SUDDENLY, WHAT WOULD HAPPEN TO R OF INSECTS?	--respond, "There would be lots more," "More would grow."
ents to suggest and discuss other living isappearance would affect groups of living	

MATERIALS

TEACHING STRATEGIES

Send in Tallysheet 4-2.

CHANGE OF

See Change of Pacers 6 and 7.

TEACHING STRATEGIES

eet 4-2.

acers 6 and 7.

ANTICIPATED STUDENT BEHAVIORS

Upon completion of this activity, each student should, as a minimum:

- *--identify by observation or inferences one plant and one animal living in the local area*
- *--state how the disappearance of one group of plants or animals might possibly affect other living things*
- *--be able to complete links in a food web.*

CHANGE OF PACER

UNIT IV, CORE A
ACTIVITY 4-5

Activity name suggested by class:

Teacher___________________

BSCS USE: Post___ Tally___ Rev___

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile ☐ Of value--needs the ☐ Worth salvaging--make ☐ Worthless

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is
☐ Of value--needs the revision suggested
☐ Worth salvaging--make major changes described
☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s)______________ Comment:

Specific Questions:

12. Was the concept of interdependency grasped by most students? ☐ Yes ☐ No
What evidence do you have for your answer?

13. Did the local area contain enough organisms to do the activity? ☐ Yes ☐ No

14. Send in Tallysheet 4-2.

Teacher ______________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

BSCS Evaluation: EMH Feedback Form 1d

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff (we will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

1. Develop an understanding of the flow of energy through the living world.
2. Develop an understanding of cycling and appreciate the cycling relationship of the materials and organisms in the environment.

Core A Objectives for the Student:

1. Reconstruct the transfer of energy, food, and water through environmental systems.
2. Recognize the existence and importance of interrelationships between plants and animals as a result of eating and being eaten.

ENVIRONMENTAL THEME:

Diversity and Patterns

INQUIRY SKILLS:

Inferring

PROBLEM-SOLVING SKILLS:

Explaining, Defending, Answering Why Questions

PRACTICAL APPLICATION:

Practicing Communication Skills

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

1. Develop an understanding of the flow of energy through the living world.

2. Develop an understanding of cycling and appreciate the cycling relationship of the materials and organisms in the environment.

Core A Objectives for the Student:

1. Reconstruct the transfer of energy, food, and water through environmental systems.

2. Recognize the existence and importance of interrelationships between plants and animals as a result of eating and being eaten.

ENVIRONMENTAL THEME:
Diversity and Patterns

INQUIRY SKILLS:
Inferring

PROBLEM-SOLVING SKILLS:
Explaining, Defending, Answering Why Questions

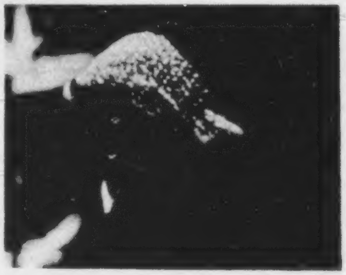
PRACTICAL APPLICATION:
Practicing Communication Skills

ACTIVITY
4-6

MATERIALS

Slide 4-4 through 4-9
*35 mm Slide projector

Slide 4-4



*Not furnished in materials kit

TEACHING STRATEGIES

Activity 4-6. Food Webs in Other Places

This activity is designed to show students some environments other than the one they visit. It will allow them to infer the conditions in these environments. Students will also have an opportunity to relate obvious environmental conditions to the plants and animals of an area.

Teacher Preparation:

For your information, a few examples of the plants and animals that might be found in the areas shown in the slides are listed below.

	Plants	Animals
4-4	Water Plants	Octopus, Lobsters, Sponge, Sharks, Whales, Crayfish, Frogs, Snails, Clams
4-5	Cypress, Spanish Moss, Mangroves, Lilies	Snake, Deer, Turtle, Alligator
4-6	Pines, Grass, Aspen, Fir, Mosses, Ferns, Berries	Deer, Bear, Cougar, Bobcat, Wolf, Squirrel, Chipmunk, Moose
4-7	Grass, Sagebrush, Bushes	Jackrabbit, Prairie Dog, Fox, Coyote, Deer, Rattlesnake
4-8	Cactus, Yucca, Chaparral, Sagebrush	Fox, Rattlesnake, Gerbil, Owl
4-9	Grass, Trees, Shrubs, Flowers	Lion, Zebra, Giraffe, Hyena, Vulture, Deer

TEACHING STRATEGIES

. Food Webs in Other Places

y is designed to show students some environ-
than the one they visit. It will allow them
conditions in these environments. Students
ve an opportunity to relate obvious environ-
tions to the plants and animals of an area.

aration:

ormation, a few examples of the plants and
might be found in the areas shown in the
isted below.

s	Animals
lants	Octopus, Lobsters, Sponge, Sharks, Whales, Crayfish, Frogs, Snails, Clams
, Spanish angroves,	Snake, Deer, Turtle, Alligator
Grass, Fir, Mosses, Berries	Deer, Bear, Cougar, Bobcat, Wolf, Squirrel, Chipmunk, Moose
Sagebrush,	Jackrabbit, Prairie Dog, Fox, Coyote, Deer, Rattlesnake
Yucca, al, Sage-	Fox, Rattlesnake, Gerbil, Owl
Trees, Flowers	Lion, Zebra, Giraffe, Hyena, Vulture, Deer

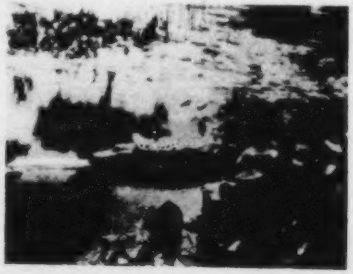
ANTICIPATED STUDENT BEHAVIORS

During this activity, each student should:

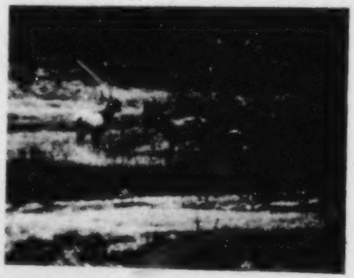
- *--observe a series of slides of various environments*
- *--participate in a discussion of the various environments*
- *--make inferences about characteristics of unknown environments.*

MATERIALS

Slide 4-5



Slide 4-6



Slide 4-7

TEACHING STRATEGIES

As much student discussion as possible should accompany these slides. The students should be asked to think of other living things they might expect to find in each area pictured. There might also be indirect evidence of some organisms that the students could use as a clue to the presence of an animal -- for example, a feather from a cardinal.

As each slide is shown, ask this series of questions:

WHERE WAS THIS PICTURE TAKEN? WHY DO YOU THINK SO?

WHAT KINDS OF PLANTS DO YOU SEE?

WHAT KINDS OF ANIMALS DO YOU SEE?

DO THESE ANIMALS (PLANTS) LIVE AROUND HERE?

WHICH ONES COULD WE NOT FIND IN OUR AREA? WHY?

WHAT OTHER PLANTS (ANIMALS) DO YOU SUPPOSE LIVE AT THIS PLACE? WHY? HOW DO YOU KNOW?

WHAT IS THE WEATHER LIKE AT THIS PLACE?

WHAT DO THE ANIMALS IN THE PICTURE EAT? WHAT EATS THEM?

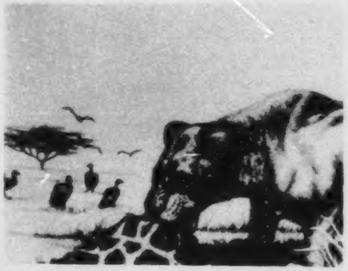
TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
discussion as possible should accompany he students should be asked to think of ngs they might expect to find in each There might also be indirect evidence s that the students could use as a clue of an animal -- for example, a feather	Students should:
shown, ask this series of questions:	
HIS PICTURE TAKEN? WHY DO YOU	--infer the locations of the pictures and tell what they used as clues.
OF PLANTS DO YOU SEE?	--describe in general terms the plants in the pictures.
OF ANIMALS DO YOU SEE?	--describe the animals in the pictures.
IMALS (PLANTS) LIVE AROUND HERE?	--identify local plants and animals as much as possible.
COULD WE NOT FIND IN OUR AREA?	--identify those plants and animals not found in the area and give reasons why not, such as, "No food," "Too large," "Too cold," "Too wet," "Too dry," "Too many people," and so forth.
LANTS (ANIMALS) DO YOU SUPPOSE PLACE? WHY? HOW DO YOU KNOW?	--infer what other plants and animals live there.
WEATHER LIKE AT THIS PLACE?	--speculate about the climate of the place.
ANIMALS IN THE PICTURE EAT? WHAT	--describe possible food sources of animals described.

ACTIVITY
4-6

MATERIALS

Slide 4-8

Slide 4-9



TEACHING STRATEGIES

WHY DO THE LIVING THINGS PICTURED DEPEND ON EACH OTHER?

LETS USE THE PLANTS AND ANIMALS IN THE PICTURE AND THE ONES YOU SUGGESTED, TO MAKE A FOOD CHAIN.

Put the food chain suggested by the students on the chalkboard.

COULD YOU LIVE AT THIS PLACE? WHY? WHY NOT?

Continue with this line of questioning for each slide.

CHAN

See Change of Pacers 8 and 9.

TEACHING STRATEGIES

THE LIVING THINGS PICTURED DEPEND ON
THER?

SE THE PLANTS AND ANIMALS IN THE PICTURE
E ONES YOU SUGGESTED, TO MAKE A FOOD

d chain suggested by the students on the

YOU LIVE AT THIS PLACE? WHY? WHY NOT?

th this line of questioning for each slide.

CHANGE OF PACER

f Pacers 8 and 9.

ANTICIPATED STUDENT BEHAVIORS

Students should:

--recognize food relationships and make responses such as, "The buffalo eats grass," "The ________ eats ________."

--suggest which plants and animals would fit into a food chain.

--speculate on their life needs and decide if the pictured environment could satisfy those needs.

Upon completion of this activity, each student should, as a minimum:

--have participated in the description of one or more of the slides
--have made at least one inference about one of the pictured environments.

ACTIVITY 4-6

Activity name suggested by class:

Teacher______________________

BSCS USE: Post___ Tally___ Rev___

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile ☐ Of value--needs the ☐ Worth salvaging--make ☐ Worthless

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s)____________ Comment:

Specific Questions:

12. For each slide check the appropriate box if your class was able to name other plants, animals, weather or food related to the slide:

	4-4 Fish	4-5 Crocodile	4-6 Elk	4-7 Buffalo	4-8 Snake	4-9 Lion
Plants Animals Weather Food						

13. Could students construct food chains from plants and animals pictured?
☐ All ☐ Some ☐ Few ☐ None

Teacher ______________________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

BSCS Evaluation: EMH Feedback Form 1d

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff (we will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

1. Develop an understanding of the flow of energy through the living world.

5. Comprehend the role of man as an integral part of nature not apart from nature.

Core A Objectives for the Student:

1. Reconstruct the transfer of energy, food, and water through environmental systems.

2. Recognize the existence and importance of interrelationships between plants and animals as a result of eating and being eaten.

ENVIRONMENTAL THEME:

Interrelationships of Environmental Components, Complementarity of Organisms and Environment, Flow of Energy

INQUIRY SKILLS:

Identifying, Associating, Describing

PROBLEM-SOLVING SKILLS:

Explaining, Defending, Answering Why Questions

PRACTICAL APPLICATION:

Following Directions, Practice Communication Skills

CTIVITY

oals for the Student:

. Develop an understanding of the flow of energy through the living world.

. Comprehend the role of man as an integral part of nature not apart from nature.

Objectives for the Student:

. Reconstruct the transfer of energy, food, and water through environmental systems.

. Recognize the existence and importance of interrelationships between plants and animals as a result of eating and being eaten.

AL THEME:
elationships of Environmental
ents, Complementarity of Organisms and
nment, Flow of Energy

LLS:
fying, Associating, Describing

VING SKILLS:
ning, Defending, Answering Why Questions

PPLICATION:
ing Directions, Practice Communication

BSCS

UNIT IV.	TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT
CORE A.	ENERGY AND MATERIAL TRANSFER
ACTIVITY 4-7.	CLUES TO SUCCESS

ACTIVITY
4-7

MATERIALS

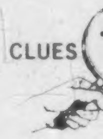
Worksheet 4-3
Slides 4-10 through 4-13
*Many magazines containing plant and animal pictures
*Scissors
*Butcher paper
*Large felt pens or crayons
*Paste or tape
*35 mm Slide projector

*Not furnished in materials kit

TEACHING STRATEGIES

Activity 4-7. Clues to Success

This clue to success is divided into two parts. The first is structured. Its completion should aid in the success of the second, which is relatively unstructured to allow latitude for the student's imagination.



Part I.

Before giving students Worksheet 4-3, turn to the Progres in Following Directions page of the Student Record of Progress. Use the guidelines to rate your students on their ability to follow directions. Distribute Worksheet 4-3.

Then say:

> FIRST FIND SIDE A OF YOUR WORKSHEET. NOW, LISTEN CAREFULLY. WE ARE GOING TO PRACTICE FOLLOWING DIRECTIONS. LISTEN VERY CAREFULLY AND DO THINGS JUST AS I ASK YOU TO. I WILL REPEAT EACH DIRECTION ONLY ONE TIME.
>
> PRINT YOUR NAME IN THE SPACE AT THE TOP OF THE WORKSHEET.

TEACHING STRATEGIES

1. Clues to Success

success is divided into two parts. The
uctured. Its completion should aid in the
he second, which is relatively unstructured
itude for the student's imagination.

CLUES TO SUCCESS

g students Worksheet 4-3, turn to the Progress
Directions page of the Student Record of
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y to follow directions. Distribute Worksheet

IND SIDE A OF YOUR WORKSHEET. NOW, LISTEN
LY. WE ARE GOING TO PRACTICE FOLLOWING
ONS. LISTEN VERY CAREFULLY AND DO THINGS
I ASK YOU TO. I WILL REPEAT EACH DIRECTION
E TIME.

OUR NAME IN THE SPACE AT THE TOP OF THE
ET.

ANTICIPATED STUDENT BEHAVIORS

During this activity, each student should:

- *--answer each of the four instructional assessment questions on Worksheet 4-3*
- *--cut out of magazines pictures of plants and animals that are related*
- *--indicate with lines on his food web some interrelationships between the plants and animals*
- *--explain to the class how materials and energy move through his food web*
- *--explain to the class how the disappearance of one kind of organism in his food web might affect other organisms in the web.*

Students should:

--print their name in the space at the top of the worksheet.

MATERIALS

Slide 4-10 and 4-11,
Worksheet 4-3A

Slide 4-12 and 4-13,
Worksheet 4-3B

TEACHING STRATEGIES

Pause; repeat the direction; pause again; then say:

> PRINT THE DATE UNDER YOUR NAME.

Pause; repeat the direction; pause again; then say:

> MARK AN X IN THE LOWER RIGHT-HAND CORNER OF THE WORKSHEET.

Pause; repeat the direction; pause again; then say:

> CIRCLE THE WORKSHEET NUMBER.

Pause; repeat the direction; pause again; then say:

> DRAW A BOX AROUND YOUR NAME.

Pause; repeat the direction; pause again; then say:

> NOW WE ARE GOING TO ANSWER SOME QUESTIONS ABOUT FOOD WEBS.

Read each question and possible answers aloud to the students, while projecting the slides in order for each question. Repeat each question and allow ample time for the students to mark their worksheets.

When the students are finished, collect the worksheets. Then project Slides 4-10 through 4-12 again, discussing the questions and answers with them. Encourage students to defend their choices. After class, tally the students'

TEACHING STRATEGIES

direction; pause again; then say:

ATE UNDER YOUR NAME.

direction; pause again; then say:

N THE LOWER RIGHT-HAND CORNER OF THE

direction; pause again; then say:

ORKSHEET NUMBER.

direction; pause again; then say:

ROUND YOUR NAME.

direction; pause again; then say:

OING TO ANSWER SOME QUESTIONS ABOUT

n and possible answers aloud to the
rojecting the slides in order for each
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es 4-10 through 4-12 again, discussing
answers with them. Encourage students
hoices. After class, tally the students'

ANTICIPATED STUDENT BEHAVIORS

Students should:

--print their name.

--mark an X in the lower right-hand corner of their worksheet.

--circle the worksheet number.

--draw a box around their name.

--mark an X on the plant in answer to Question 1.
--mark Choice B in answer to Question 2.
--mark Choice B in answer to Question 3 after inferring that the number of fish in the pond will decrease as a result of a decreasing food supply.
--mark A and E in answer to Question 4 after inferring that the grass would grow taller with no rabbits to eat it and that the hawks would decrease since there are fewer rabbits to eat.

MATERIALS

TEACHING STRATEGIES

answers on Tallysheet 4-3. Consider whether the whole class needs further review or if a few individuals need special attention. Send in Tallysheet 4-3.

Then proceed to the next part.

Part II.

Instruct students to cut pictures of plants and animals that they believe are part of a food web out of the magazines you provide. It is important that you obtain sufficient magazines with appropriate plant and animal pictures. Several that would be excellent for this purpose are:

Ranger Rick, National Wildlife, International Wildlife
all available from: National Wildlife Federation
1412 - 16 Street, N.W.
Washington, D. C. 20036

Audubon Magazine
950 - 3rd Avenue
New York, New York 10022

Arizona Highways
2039 W. Louis Avenue
Phoenix, Arizona 85009

and

National Geographic
17th and M Streets, N.W.
Washington, D. C. 20036

Friends, other teachers, and students may be able to help in supplying copies of the above. Don't forget to seek out your school librarian, who may have back issues that can be cut up. Sports magazines (Outdoor Life, Field & Stream, etc.) available at most newsstands should also prove useful.

Have the students tape or paste pictures onto a large piece of butcher paper. After they have placed the

TEACHING STRATEGIES

Tallysheet 4-3. Consider whether the whole
further review or if a few individuals need
ntion. Send in Tallysheet 4-3.

to the next part.

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cher paper. After they have placed the

ANTICIPATED STUDENT BEHAVIORS

MATERIALS	TEACHING STRATEGIES
	pictures on the paper, have them connect the plants and animals with arrows, using felt pens or crayons to show the relationships that exist.

When the food webs are complete, ask each student to display his food web and explain to the class the relationships he has drawn. Ask each student to explain how energy and materials are passed through the food web, and also to show how the disappearance of one kind of living thing might affect his food web.

As each student explains his food web, capitalize on the good things that are in the food web. You can use this activity as a gauge of your teaching success in Activities 4-1 through 4-6. The activity has achieved its purpose if all of your students made a reasonable food web and have shown basically accurate interrelationships. Evaluate in your own mind the posters that do not meet this minimal standard. Perhaps you will need to backtrack to make certain concepts clearer. Success will be determined by the ability of the students to explain material and energy flow and disruptions in their food web.

Display all the food webs somewhere in your room.

Interpreting and Scoring:

Items 1 and 2: Assess the concept of transfer of energy in the food web. Students must draw conclusions from data presented. Additional work on food chains will be needed for those students who mark these answers wrong.

TEACHING STRATEGIES

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ows, using felt pens or crayons to show
s that exist.

WORK
TIME

s are complete, ask each student to
web and explain to the class the
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how the disappearance of one kind of
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gy flow and disruptions in their food

ood webs somewhere in your room.

Scoring:

ssess the concept of transfer of energy
Students must draw conclusions from
Additional work on food chains will be
students who mark these answers wrong.

ANTICIPATED STUDENT BEHAVIORS

Students should:

--construct, individually, a picturial food web.

MATERIALS

TEACHING STRATEGIES

Find the column marked Activity 4-7, Transfer of Energy, on the Concepts page of the Student Record of Progress. Circle YES if the student has answered both Questions One and Two correctly. Otherwise, circle NO.

Items 3 and 4: Assess the understanding of the interrelationships between living things in the environment. These items assess a higher level of problem-solving skills, and answering one out of a possible three will indicate success.

Find the column marked Activity 4-7, Effects on Food Webs on the Problem-solving page of the Student Record of Progress. Circle YES if the student answered one of the three possibilities correctly. Otherwise, circle NO.

Turn to the Progress in Following Directions page of the Student Record of Progress.

Five directions were given to students:

1. to print their name in the space at the top of the paper
2. to print the date under their name
3. to mark an X in the lower right-hand corner of the worksheet
4. to circle the worksheet number
5. to draw a box around their name.

Circle YES if at least four directions were correctly followed. Circle NO if only one or none of the five directions were followed. Circle PART for the remaining students to indicate partial ability to follow directions

Turn to the Responsibility and Involvement page of

TEACHING STRATEGIES

umn marked Activity 4-7, Transfer of Energy,
ots page of the Student Record of Progress.
f the student has answered both Questions
correctly. Otherwise, circle NO.

: Assess the understanding of the inter-
s between living things in the environment.
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umn marked Activity 4-7, Effects on Food Webs,
em-solving page of the Student Record of
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ssibilities correctly. Otherwise, circle NO.

Progress in Following Directions page of
Record of Progress.

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rksheet

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re followed. Circle PART for the remaining
ndicate partial ability to follow directions.

esponsibility and Involvement page of

ANTICIPATED STUDENT BEHAVIORS

MATERIALS

TEACHING STRATEGIES

the Student Record of Progress. Using the guidelines, rate each student's involvement in science.

EACHING STRATEGIES

of Progress. Using the guidelines,
s involvement in science.

ANTICIPATED STUDENT BEHAVIORS

Upon completion of this activity, each student should, as a miminum:

- *--have completed Worksheet 4-3*
- *--have constructed a food web using pictures cut from magazines*
- *--have described his food web picture orally in terms of the plant and animal relationships shown.*

UNIT IV, CORE A
ACTIVITY 4-7

Activity name suggested by class:

Teacher ______________________

BSCS USE: Post___ Tally___ Rev___

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile ☐ Of value--needs the ☐ Worth salvaging--make ☐ Worthless

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is
☐ Of value--needs the revision suggested
☐ Worth salvaging--make major changes described
☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s)______________ Comment:

Specific Questions:

12. Did students have difficulty using worksheet 4-3? ☐ Yes ☐ No Comment:

13. Were appropriate pictures found in adequate numbers? ☐ Yes ☐ No Comment:

14. Were the students able to explain the food web relationships they drew?
☐ Yes ☐ No Comment:

Teacher ______________________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

BSCS Evaluation: EMH Feedback Form 1d

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff (we will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

REACTIONS TO CORE A

1. Was the background information for this core clear and useful? ☐ Yes ☐ No
Comment:

2. Was there too much preparatory reading and too many directions given to the teacher? ☐ Yes ☐ No
Comment:

3. Was it clear to you why these particular activities were chosen and the direction they were leading? ☐ Yes ☐ No

4. How would you increase the clarity of this core for students? (Help them understand why they are doing these activities.)

5. Is there a practical (take-home) value for your students in these activities?
☐ Yes ☐ No If yes, what do you see as the "take-home" lesson? If no, what is needed?

6. In these materials, what things did your students find difficult to do?

7. Comment about the amount of reading and writing required of students. Should there be more or less in this core?

8. Were the Clues to Success and Student Record of Progress helpful in this core?
☐ Yes ☐ No If helpful, how are they helpful?

9. Did you make use of the Planning Guide included in the introductory material for this core? ☐ Yes ☐ No
Comment:

10. During this core was class time taken for students to observe the pond, pets, or plants; play games from earlier activities, or explore science ideas not in the materials? ☐ Yes ☐ No
Comment:

11. If you could teach your way, rather than following the Guide, how would you do it?

12. Did the activities fulfill the purposes described by the core objectives and rationale? ☐ Yes ☐ No
Comment:

7. Comment about the amount of reading and writing required of students. Should there be more or less in this core?

8. Were the Clues to Success and Student Record of Progress helpful in this core?
☐ Yes ☐ No If helpful, how are they helpful?

9. Did you make use of the Planning Guide included in the introductory material for this core? ☐ Yes ☐ No
Comment:

10. During this core was class time taken for students to observe the pond, pets, or plants; play games from earlier activities, or explore science ideas not in the materials? ☐ Yes ☐ No
Comment:

11. If you could teach your way, rather than following the Guide, how would you do it?

12. Did the activities fulfill the purposes described by the core objectives and rationale? ☐ Yes ☐ No
Comment:

13. Which of your students do you believe were unsuccessful in achieving the objectives of this core of activities? Explain:

BSCS Evaluation: EMH Feedback Form 2a

NEW STUDENTS ENTERING DURING THIS CO

Date Entered	Last Name	Name Used	Ethnic Group	Sex	Birthdate	Test Date	Tes
			W B S O	M F			W B
			W B S O	M F			W B
			W B S O	M F			W B
			W B S O	M F			W B
			W B S O	M F			W B
			W B S O	M F			W B

W = white
B = black
S = Spanish-
American
O = other

W=WIS
B=Bin
O=Oth
(Na

STUDENTS DROPPED IN THIS PERIOD

Date Dropped	Last Name	First	Reason for Dropping

NEW STUDENTS ENTERING DURING THIS CORE

roup	Sex	Birthdate	Test Date	Test	Total	Verbal	Performance	Previous Test Score
O	M F			W B O				
O	M F			W B O				
O	M F			W B O				
O	M F			W B O				
O	M F			W B O				
O	M F			W B O				

e
k
ish-
ican
r

W=WISC
B=Binet
O=Other
(Name)

son for Dropping

Me and my
Environment

UNIT IV. TRANSFER AND CYCLING OF
MATERIALS IN MY ENVIRONMENT

CORE B. DECOMPOSERS IN
MY ENVIRONMENT

AIMS FOR ME AND MY ENVIRONMENT

1. DEVELOPMENT IN EACH CHILD OF A SENSE OF IDENTITY AS A PERSON WHO HAS SOME DEGREE OF CONTROL OVER AND CAN ACT ON HIS ENVIRONMENT. This will lead to a degree of self-determination based on a rational coping with situations rather than on a passive compliance or an impulsive response to problems.
2. DEVELOPMENT IN EACH CHILD OF A SUCCESS SYNDROME. More than anything else, each activity is intended to be a success experience for each child. It is the teacher's responsibility -- almost obligation -- to see that each child succeeds at a level that is challenging to his abilities and that preserves his self-respect. It is a further responsibility of the teacher to point out his achievement. The students as a group should help each individual fit what he has done into a pattern of accomplishment.
3. DEVELOPMENT IN EACH CHILD OF AN INTEREST THAT COULD BECOME A HOBBY OR AVOCATION OVER A LIFETIME (through an exposure to an array of experiences in science). It is hoped that many children will find some area -- perhaps growing plants, caring for animals, identifying flowers, collecting things, or simply enjoying outings into the country -- that they feel strongly about and can develop some competence or knowledge in. This would provide a means of self-expression, and (perhaps) allow some degree of sharing or involvement with others.
4. DEVELOPMENT IN EACH CHILD OF A SENSE OF RELATIONSHIP AND EMPATHY WITH OTHER LIVING THINGS. It is hoped that this will lead to a positive regard and caring about what affects them as individuals and as a group, because what affects them affects the community of man.
5. DEVELOPMENT IN EACH CHILD OF AN UNDERSTANDING OF ENVIRONMENTAL CONDITIONS that will lead to a sense of responsibility for the environment and actions that protect or improve it.

1. Develop an understand
2. Develop an understand
   relationship of the m
3. Recognize the role of
4. Realize that because
   to which man uses the
5. Comprehend the role o
   nature.

1. Recognize the role mi
2. Discover environmental
3. Appreciate how knowle
4. Conclude that microbes
   problems for man.

UNIT IV. TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT

CORE B. DECOMPOSERS IN MY ENVIRONMENT

BSCS

UNIT IV GOALS

1. Develop an understanding of the flow of energy through the living world.
2. Develop an understanding of cycling and appreciate the cycling relationship of the materials and organisms in the environment.
3. Recognize the role of decomposers in the cycling process.
4. Realize that because certain materials are in finite supply, the extent to which man uses these materials will have an impact on the environment.
5. Comprehend the role of man as an integral part of nature not apart from nature.

CORE B OBJECTIVES

1. Recognize the role microbes play in the decomposition process.
2. Discover environmental requirements of microbes and other decomposers.
3. Appreciate how knowledge of decomposers can improve man's environment.
4. Conclude that microbes contribute to man's well-being as well as pose problems for man.

UNIT IV. TRANSFER AND CYCLING OF
MATERIALS IN MY ENVIRONMENT

CORE B. DECOMPOSERS IN
MY ENVIRONMENT

CORE B RATIONALE

After developing the concept of a food web (Core A), the student may naturally ask the question: food web -- then what? In other words, what happens at the end of a food chain? Obviously generation upon generation of dead plants and animals do not accumulate in the environment. All organisms die and eventually decompose; the materials are then recycled through the environment. An attempt has been made -- not to account for the cycling of specific materials -- but simply to develop an appreciation of the role of decomposers in the natural economy and to develop the general concept of a cycle.

The accumulation of dead material is reviewed by referring to the class compost that was set up in Activity 4-0. The students are then introduced to the concept of scavengers in the environment (Activity 4-8). These scavengers begin the decomposing of the dead material in the environment. A short activity follows that suggests the role of such visible decomposers as pill bugs or worms (Activity 4-9). In Activity 4-10 the compost is reexamined and then put to practical use in Activity 4-11 when the students plant seeds in it. After students have observed and discussed the compost, they focus on the role of microbes in the decomposition process. Activity 4-12 shows the presence of microbes in the compost through an experiment that demonstrates that microbes breathe. The next activities (4-13 and 4-14) consider the kinds of environments necessary for microbes to grow and participate in the decomposition process. Students discover that wet and warm environments encourage microbial growth. This concept is extended to the "real world" by a visit to a grocery store (or school cafeteria), where food storage and preparation is examined (Activity 4-15). The various methods of food packaging are examined in terms of conditions for microbial growth considered earlier. The core is concluded by directing attention again to the positive aspects of microbial activity. Microbes (yeast) are used to produce bread and wine in the classroom (Activity 4-17). In Activity 4-18 students use Food Chain cards, along

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with a new componen
the important role
environment.

B

Activity 4-8
concept of scaveng
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discarded by other
decomposers, breaki
animals that functi
gull, crow, earthwo
this activity becau
the classroom. Sow
bugs) are really sm
important function
classroom is to re
shelter, food, and
Wonderland) is the

Activity 4-12
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experiment then fol
(containing microbe
to be developed is
is due to living mi
"breathing" just as
alive. The success
indicator solution
indicator is a subs
by changing color.
green or yellow col

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not to account for
velop an apprecia-
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referring to the
students are then
onment (Activity 4-8).
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Activity 4-10 the
n Activity 4-11 when
observed and discussed
e decomposition
s in the compost
breathe. The next
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tion process. Students
robial growth. This
a grocery store (or
is examined (Activity
mined in terms of
The core is concluded
of microbial activity.
n the classroom
Chain cards, along with a new component -- decomposers -- to construct food cycles that show the important role of decomposers in cycling materials through the environment.

BACKGROUND INFORMATION FOR THE TEACHER

Activity 4-8 (Starting to Round Up the Food Chain) introduces the concept of scavengers in the environment. The term "scavenger" is usually applied to an animal that feeds on dead or dying material often discarded by other living things. In this role they function as decomposers, breaking down complex materials to simpler ones. Some animals that function as scavengers are the opossum, hyena, rat, vulture, gull, crow, earthworm, ant, snail, and sow bug. The latter are used in this activity because of their wide distribution and ease of handling in the classroom. Sow bugs (some that roll into a ball are known as pill bugs) are really small land-dwelling crustaceans, and not insects. An important function served by the maintenance of pill bugs in the classroom is to reinforce the essential components of an environment: shelter, food, and water. Activity 4-9 (Pill Bug Paradise and Worm Wonderland) is the making of the pill bug or worm environment.

Activity 4-12 (Compost Microbes) uses a simple demonstration that human beings change the air they breathe (produce carbon dioxide). An experiment then follows that demonstrates that a sample of class compost (containing microbes) changes the air in a similar way. The conclusion to be developed is that the decomposition occurring in the compost pile is due to living microbes. Students are led to believe that microbes are "breathing" just as they themselves are, and therefore microbes are probably alive. The success of this activity depends upon the use of a chemical indicator solution to detect carbon dioxide dissolved in water. An indicator is a substance that shows the presence of a chemical substance by changing color. Bromthymol blue is an indicator that changes to a green or yellow color in the presence of an acid. Carbon dioxide (CO_2)

BACKGROUND INFORMATION FOR THE TEACHER (continued)

forms an acid when dissolved in water. Therefore, in this experiment, bromthymol blue can be used to indicate, indirectly, the presence of CO_2.

Activity 4-13 (Wet and Dry) provides a link between the concept of environmental requirements and the function of microbes as decomposers. An assortment of organic materials (mostly foodstuffs of plant origin) are subjected to wet and dry conditions. The samples exposed to moist storage will usually develop very obvious microbial (fungus) growth. The success of this activity depends on the careful choice of test materials: If beans, peas, or other seeds are used, be certain that they are intended for use as food and not seeds for gardening. Seeds prepared for planting usually are treated to prevent fungus growth. If bread is used, be sure that it contains no preservative (now a common ingredient) to prevent mold. The bread should be stale to begin with since fresh bread may contain enough moisture to support mold, even in a dry chamber. Be sure that selection of otherwise dry materials excludes salted and sugared products. Microbial growth in these materials will be inhibited by the salt or sugar solutions. In certain communities, the storage of hay for livestock feed may be of local importance. If so, use hay or straw for this sample. Hay is harvested in a green condition before the plant seeds mature.

Nutrients are therefor
is a term applie to th
for grain. These stal
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Activity 4-14 (Co
requirement theme esta
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requires no special pr

Activity 4-15 (St
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directed toward the st
preservation.

Activity 4-17 (A
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Part II, the use of ye
of carbon dioxide prod

Activity 4-18 (Ro
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presence of CO_2.

the concept of
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plant origin) are
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wth. The success
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ey are intended
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is used, be sure
t) to prevent
sh bread may contain
Be sure that
sugared products.
the salt or sugar
or livestock feed
this sample. Hay
mature.

Nutrients are therefore retained with a greater likelihood of mold. Straw is a term applie to the stalks of a plant whose seeds have been harvested for grain. These stalks contain little or no residual nutrients and are less likely to develop microbial growth in a short time.

Activity 4-14 (Cool and Warm) is a variation of the habitat-requirement theme established earlier. The concept that microbial growth may be limited by a specific condition is expanded to another example, that of refrigeration. This is a straightforward experiment and requires no special precautions.

Activity 4-15 (Stor(ing) Problems) is a visit to a local grocery store or to the school cafeteria. Emphasis here should be placed on the variety of packaging and storage methods employed and should be directed toward the students' "real" world of food storage and preservation.

Activity 4-17 (A Real Gas) directs attention again to the positive role of microbes. Part I consists of a demonstration of fermentation in which man benefits directly from the products of microbial action. In Part II, the use of yeast in baking demonstrates the practical application of carbon dioxide production by microbes.

Activity 4-18 (Rounding Out the Food Chain) should make the role of decomposers in the cycling of materials more apparent.

Me and my Environment

UNIT IV.
CORE B.

PLANNING GUIDE

NOTE: Some activities (*indicated in italics and an* ◤ *in*
be prepared several days or weeks in advance. Use
a teaching and preparation schedule. All supplies

Activity Number, Page, Tentative Teaching Time	Check List of Supplies Needed		
	Materials You Furnish	Materials in Supply Kit	(*Ital*
4-8. Starting to Round up the Food Chain Days needed: 1	35 mm Slide projector	Flash cards: Hawk Frog Mosquito Man Cow Grass Slide 4-14 Slide 4-15 Slide 4-16 Slide 4-17 Slide 4-18 Slide 4-19 Slide 4-20 Slide 4-21	*Materials* *Arrangeme* Vulture c Beetle on Ant close Anthill a Rotting l Board Board tur Microscop
4-9. Pill Bug Paradise and Worm Wonderland Days needed: 1	Covered plastic shoe box or fish aquarium Pieces of potato and carrot Sponge Leaves Pill bugs Spade or fork Gallon jar Soil Sand Earthworms Lettuce Grass		One Small pie Small, te Dried lea 25 to 50 Widemouth About ten

PLANNING GUIDE

activities (*indicated in italics and an* ↙ *in the margin*) must
repared several days or weeks in advance. Use this summary as
aching and preparation schedule. All supplies needed are listed.

BSCS

of Supplies Needed		Notes and Suggestions to Teacher (*Italics and Arrow Indicate Advance Preparation Directions*)
	Materials in Supply Kit	
		Materials for Activity 4-9 must be secured now.
	Flash cards:	
	Hawk	
	Frog	*Arrangements for field trip in Activity 4-15 should be made now.*
	Mosquito	
	Man	
	Cow	
	Grass	
	Slide 4-14	Vulture on carcass
	Slide 4-15	Beetle on carcass
	Slide 4-16	Ant close-up carrying food
	Slide 4-17	Anthill activity
	Slide 4-18	Rotting log
	Slide 4-19	Board
	Slide 4-20	Board turned over--sow bugs, slugs, etc.
	Slide 4-21	Microscopic decomposers
or		
rot		One
		Small pieces
		Small, test tube plug
		Dried leaves
		25 to 50
		Widemouthed
		About ten

Me and my Environment

UNIT IV.
CORE B.

PLANNING GUIDE

NOTE: Some activities (*indicated in italics and an* ◤ *in the* be prepared several days or weeks in advance. Use thi a teaching and preparation schedule. All supplies nee

Activity Number, Page, Tentative Teaching Time	Check List of Supplies Needed		
	Materials You Furnish	Materials in Supply Kit	(*Italics a*
4-9. Pill Bug Paradise and Worm Wonderland (continued)	Cornmeal		
	Black paper		One sheet
	Tape		
4-10. Talking Rot	Compost piles		From Activity
		Worksheet 4-0	
		Equal-arm balance kits	Four
Days needed: 1			
4-11. Planting in Compost	Compost piles		Class compost
	Cleaned, 1/2-pint milk cartons		Two per stude
	Popsicle sticks or pieces of masking tape		Two per stude
Days needed: 1-2	Felt pens		Several for c
	Trowels		Several for c
	Commercial planting soil		
		Peat pots	Two per stude
		Seeds:	
		Marigold	
		Bean	One package o
4-12. Compost Microbes	Compost		From Activity
	Water		
		Flask, 250 ml, widemouthed	One per pair
Days needed: 2		Water pipe	One per stude
		Rubber stopper, #8, one-hole	One per pair
		Tygon tubing, 1/4-inch I.D., 12 inches long	One per pair

PLANNING GUIDE

tivities (*indicated in italics and an* ⬋ *in the margin*) must
ared several days or weeks in advance. Use this summary as
ing and preparation schedule. All supplies needed are listed.

BSCS

Supplies Needed

Materials in Supply Kit	Notes and Suggestions to Teacher (*Italics and Arrow Indicate Advance Preparation Directions*)
	One sheet
	From Activity 4-0, partially completed
Worksheet 4-0	
Equal-arm balance kits	Four
	Class compost piles from Activity 4-0
	Two per student
	Two per student
	Several for class use
	Several for class use
Peat pots	Two per student
[illegible]	
Marigold	
Bean	One package of each per class
	From Activity 4-0
Flask, 250 ml, widemouthed	One per pair of students
Water pipe	One per student
Rubber stopper, #8, one-hole	One per pair of students
Tygon tubing, 1/4-inch I.D., 1[illegible] inches long	One per pair of students

Me and my Environment

UNIT IV.
CORE B.

PLANNING GUIDE

NOTE: Some activities (*indicated in italics and an* ➘ *in* be prepared several days or weeks in advance. Use a teaching and preparation schedule. All supplies

Activity Number, Page, Tentative Teaching Time	Check List of Supplies Needed		
	Materials You Furnish	Materials in Supply Kit	(*Ital*
4-12. Compost Microbes (continued)		Acrylic tubing, 1/4-inch I.D., 3 inches long	One per p
		Carbon dioxide test solution (bromthymol blue)	In droppi
		Measuring spoons	One set p
		Beaker or baby food jar	One per p
4-13. Wet and Dry	35 mm Slide projector		
	Assorted dry foods		Examples:
	Masking tape		
Days needed: 2	Dark storage area		Such as a
		Slide 4-22	Worksheet
		Worksheet 4-4	Wet and D
		Plastic petri dishes with covers, 9 cm	Two per s
		Filter paper discs, 7 cm	Two per s
		Medicine dropper	One per s
4-14. Cool and Warm	35 mm Slide projector		
	Ice chest or refrigerator		
	Baby food jars or milk cartons		Two per s
Days needed: 1	Plastic kitchen wrap		One roll
	Food samples		Provide f
		Slide 4-23	Worksheet
		Worksheet 4-5	Cool and
	Masking tape		For label

PLANNING GUIDE

BSCS

activities (*indicated in italics and an* ↖ *in the margin*) must
epared several days or weeks in advance. Use this summary as
ching and preparation schedule. All supplies needed are listed.

of Supplies Needed	Notes and Suggestions to Teacher (*Italics and Arrow Indicate Advance Preparation Directions*)
Materials in Supply Kit	
Acrylic tubing, 1/4-inch I.D., 3 inches long	One per pair of students
Carbon dioxide test solution (bromthymol blue)	In dropping bottles, one per pair of students
Measuring spoons	One set per pair of students
Beaker or baby food jar	One per pair of students
	Examples: cornflakes, egg noodles, cornmeal, flour, tea, hay, beans (dried for cooking), peas (dried for cooking)
	Such as a cardboard carton, file drawer
Slide 4-22	Worksheet 4-5
Worksheet 4-4	Wet and Dry
Plastic petri dishes with covers, 9 cm	Two per student
Filter paper discs, 7 cm	Two per student--paper towel may be used as a substitute
Medicine dropper	One per student
	Two per student
	One roll
	Provide food samples usually refrigerated
Slide 4-23	Worksheet 4-5
Worksheet 4-5	Cool and Warm
	For labeling

Me and my Environment

UNIT IV.
CORE B.

PLANNING GUIDE

NOTE: Some activities (*indicated in italics and an* ✔ *in the*
be prepared several days or weeks in advance. Use thi
a teaching and preparation schedule. All supplies nee

Activity Number, Page, Tentative Teaching Time	Check List of Supplies Needed		
	Materials You Furnish	Materials in Supply Kit	*(Italics*
4-15. Stor(ing) Problems Days needed: 2	Cassette tape recorder Blank tapes		Optional Optional *You should co* *(at least one* *for details.*
4-16. Clues to Success Days needed: 2	35 mm Slide projector Groceries	Slide 4-24 Slide 4-25 Slide 4-26 Worksheet 4-6	At least 20 Question 1, Question 2, Question 3, Clues to Succ
4-17. A Real Gas Days needed: 3	Dried yeast Large bowls Frozen grape juice (concentrated) Granulated sugar Measuring spoons Bread pans Clean cloths Flour sifter Butter Flour (sifted all-purpose) Water		*Start classro* *for details.* Three package Four One can (Do n tives added Several table Two sets Four Four Two 1/4 pound 8 cups 4 cups lukewa

PLANNING GUIDE

ivities *(indicated in italics and an ⬉ in the margin)* must
red several days or weeks in advance. Use this summary as
ng and preparation schedule. All supplies needed are listed.

BSCS

Supplies Needed

Materials in Supply Kit	Notes and Suggestions to Teacher *(Italics and Arrow Indicate Advance Preparation Directions)*
	Optional
	Optional
	You should contact your local store manager well in advance (at least one week) before this activity. See activity for details.
	At least 20 items of great variety
Slide 4-24	Question 1, Clues to Success
Slide 4-25	Question 2, Clues to Success
Slide 4-26	Question 3, Clues to Success
Worksheet 4-6	Clues to Success
	Start classroom collection of trash paper. See Activity 4-21 for details.
	Three packages
	Four
	One can (Do not use nonconcentrated juice, which has preservatives added to prevent fermentation.)
	Several tablespoonsful
	Two sets
	Four
	Four
	Two
	1/4 pound
	8 cups
	4 cups lukewarm

Me and my Environment

UNIT IV.
CORE B.

PLANNING GUIDE

NOTE: Some activities (*indicated in italics and an* ◄ *i*
be prepared several days or weeks in advance. Use
a teaching and preparation schedule. All supplies

Activity Number, Page, Tentative Teaching Time	Check List of Supplies Needed		
	Materials You Furnish	Materials in Supply Kit	(*Ital*
4-17. A Real Gas (continued)	Salt		2 tables
	Shortening		To greas
	Pan		Two, lar
		Flasks, 250 ml, widemouthed	Two
		Rubber stopper, one-hole, #8	Two
		Tygon tubing, 18 inches long	Two piec
		Acrylic tubing, 3 inches long	Two piec
		Beakers, 400 ml	Two
		Water pipes	Two
		Carbon dioxide test solution (bromthymol blue)	
		Measuring cup	Two
4-18. Rounding Out the Food Chain	Butcher paper		Large pi
	Felt pens		One per
	Masking tape		
	35 mm Slide projector		
		Food Chain Game cards	Four sets
Days needed: 1		Slide 4-27	Pictures
		Flash cards	One deck
		Decomposer flash cards	One
		Decomposer playing cards	Four
4-19. Clues to Success	35 mm Slide projector		
		Worksheet 4-7	Review of
		Slide 4-28	Question
		Slide 4-29	Question
Days needed: 1		Slide 4-30	Question
			Question

PLANNING GUIDE

BSCS

activities (*indicated in italics and an* ⬋ *in the margin*) must
repared several days or weeks in advance. Use this summary as
aching and preparation schedule. All supplies needed are listed.

of Supplies Needed	Notes and Suggestions to Teacher (*Italics and Arrow Indicate Advance Preparation Directions*)
Materials in Supply Kit	
	2 tablespoonsful
	To grease pan
	Two, large enough to set mixing bowls in
Flasks, 250 ml, widemouthed	Two
Rubber stopper, one-hole, #8	Two
Tygon tubing, 18 inches long	Two pieces
Acrylic tubing, 3 inches long	Two pieces, each 3 inches long
Beakers, 400 ml	Two
Water pipes	Two
Carbon dioxide test solution (bromthymol blue)	
Measuring cup	Two
	Large pieces, two pieces per team
	One per team
Food Chain Game cards	Four sets
Slide 4-27	Pictures depicting a cycle
Flash cards	One deck
Decomposer flash cards	One
Decomposer playing cards	Four
Worksheet 4-7	Review of Success
Slide 4-28	Question 1, Clues to Success
Slide 4-29	Question 2, Clues to Success
Slide 4-30	Question 3, Clues to Success
	Question 4, Clues to Success

Me and my Environment

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

1. Develop an understanding of the flow of energy through the living world.
2. Develop an understanding of cycling and appreciate the cycling relationship of the materials and organisms in the environment.
3. Recognize the role of decomposers in the cycling process.

Core B Objectives for the Student:

1. Recognize the role microbes play in the decomposition process.

ENVIRONMENTAL THEME:

Interrelationships of Environmental Components, Cyclic Nature of Processes

INQUIRY SKILLS:

Observing, Describing

PROBLEM-SOLVING SKILLS:

Knowing Question and Task

PRACTICAL APPLICATION:

Practice in Verbal Expression, Increased Vocabulary, Interest in Animals in Their Environment

ACTIVITY

Goals for the Student:

1. Develop an understanding of the flow of energy through the living world.

2. Develop an understanding of cycling and appreciate the cycling relationship of the materials and organisms in the environment.

3. Recognize the role of decomposers in the cycling process.

 Objectives for the Student:

1. Recognize the role microbes play in the decomposition process.

AL THEME:
elationships of Environmental Components,
 Nature of Processes

LLS:
ing, Describing

VING SKILLS:
g Question and Task

PPLICATION:
ce in Verbal Expression, Increased
lary, Interest in Animals in Their
nment

BSCS

UNIT IV.	TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT
CORE B.	DECOMPOSERS IN MY ENVIRONMENT
ACTIVITY 4-8.	STARTING TO ROUND UP THE FOOD CHAIN

ACTIVITY
4-8

MATERIALS

Flash cards: Hawk
Frog
Mosquito
Man
Cow
Grass
Slides 4-14 through 4-21
*35 mm Slide projector

*Not furnished in materials kit

TEACHING STRATEGIES

Activity 4-8. Starting to Round Up the Food Chain

This activity is designed as an introduction to the concepts of Core B. It is not intended that the aspects of the environment hinted at in the slides be pursued in any depth. Simply elicit preliminary discussion and pose the unifying questions.

Place the six flash cards (listed in the materials column) in the chalk tray in front of the class so all students can see them.

Begin by asking:

WHO CAN ARRANGE THESE FLASH CARDS IN AN ORDER THAT SHOWS A FOOD CHAIN?

Select a volunteer who will arrange the flash cards in a logical order and explain his arrangement as he does so. When a reasonable food chain has been formed, write the names above the cards and connect them with arrows as you did in Core A.

HAWK → FROG → MOSQUITO → MAN → COW → GRASS

The focus of the next question sequence is on the two ends of the food chain. Start with the end the students can recall from Unit III by asking:

WHAT DOES GRASS EAT? WHAT DO PLANTS EAT?

If students do not know this, let them speculate and discuss what they think plants eat. It is not necessary that they have a specific answer at this point.

TEACHING STRATEGIES

. Starting to Round Up the Food Chain

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Core B. It is not intended that the aspects
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Simply elicit preliminary discussion and
fying questions.

x flash cards (listed in the materials
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see them.

ing:

ARRANGE THESE FLASH CARDS IN AN
HAT SHOWS A FOOD CHAIN?

unteer who will arrange the flash cards in
der and explain his arrangement as he does
reasonable food chain has been formed, write
ove the cards and connect them with arrows
n Core A.

FROG → MOSQUITO → MAN → COW → GRASS

the next question sequence is on the two
food chain. Start with the end the students
rom Unit III by asking:

ES GRASS EAT? WHAT DO PLANTS EAT?

do not know this, let them speculate and
they think plants eat. It is not necessary
ve a specific answer at this point.

ANTICIPATED STUDENT BEHAVIORS

During this activity, each student should:

- *--view the introductory slide sequence (4-14 through 4-21) on decomposers*
- *--participate in a preliminary discussion of decomposition*
- *--define scavenger and decomposer*
- *--contemplate the question, "Why aren't dead things piling up around us?"*

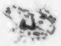
Students should:

--recall their food chain work in Activity 4-1 and place the cards in a logical food chain.

--recall their work with plants and respond, "They don't eat," "The sun," "They make their own food."

MATERIALS

Hawk


Frog

Mosquito

Man

Cow

Grasses

TEACHING STRATEGIES

After students have had time to discuss what plants eat, focus their attention on the other end of the food chain by asking:

WHAT EATS HAWKS?

The purpose of this question is to emphasize that in forming food chains, it seems that there is an end of the line. Of course there is no end of the line, but students have probably never thought about the continuation of the story. Therefore, the intent of this question is not to get an answer but rather to pose a question that students would probably not ask themselves. Continue to promote thinking by asking:

DOES SOMETHING HAVE TO EAT A HAWK? DOES THERE HAVE TO BE SOMETHING IN THE WORLD THAT EATS HAWKS?

Then ask:

DO HAWKS LIVE VERY LONG? DO THEY LIVE FOREVER?

WHAT HAPPENS TO DEAD HAWKS?

WHAT HAPPENS TO ANY ANIMAL WHEN IT DIES?

ARE THERE A LOT OF ANIMALS IN THE WORLD?

ARE A LOT OF THEM DYING EVERY DAY?

GIVE STUD
TIME
TO
THINK

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
ave had time to discuss what plants eat, ntion on the other end of the food chain	
AWKS?	--respond, "I don't know."
his question is to emphasize that in ins, it seems that there is an end of urse there is no end of the line, but obably never thought about the continua- y. Therefore, the intent of this to get an answer but rather to pose a udents would probably not ask themselves. pte thinking by asking:	
ING HAVE TO EAT A HAWK? DOES THERE SOMETHING IN THE WORLD THAT EATS	--speculate that there is probably something that eats hawks.
VE VERY LONG? DO THEY LIVE FOREVER?	--conclude that they do not live forever and respond, "No."
TO DEAD HAWKS?	--respond, "Stop flying," "Fall to the ground," "Rot."
TO ANY ANIMAL WHEN IT DIES?	--relate their experiences with dead animals and say such things as, "Rot," "Turn color," "Get buried," "Stink," etc.
LOT OF ANIMALS IN THE WORLD?	--respond, "Yes."
THEM DYING EVERY DAY?	--respond, "Yes."

GIVE STUDENTS TIME TO THINK

ACTIVITY
4-8

MATERIALS

TEACHING STRATEGIES

Ask the next three questions and anticipate a variety of student responses and answers. The student answer need not be corrected or modified at this point. The questions are meant only to be introductory in nature.

WHY DON'T WE SEE A LOT OF DEAD ANIMALS LYING AROUND ON THE GROUND?

WHAT HAPPENS TO DEAD ANIMALS?

WHY AREN'T DEAD ANIMALS PILING UP OUTSIDE?

LET'S LOOK AT SOME SLIDES THAT MIGHT GIVE US SOME CLUES.

Slide 4-14

Project Slide 4-14 and say:

WHAT DO YOU SEE IN THIS SLIDE?

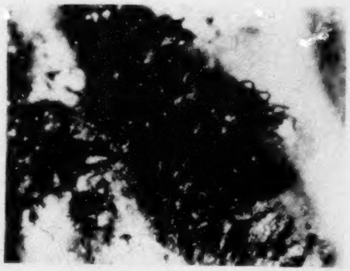
Then ask:

WHAT DOES THE PICTURE TELL US HAPPENS TO SOME DEAD ANIMALS?

DOES ANYONE KNOW WHAT WE CALL THINGS THAT EAT OTHER DEAD THINGS?

Introduce the word scavenger to your students at this point by writing it on the chalkboard. Explain that this is the word we will use to describe animals that gather and eat things that are usually discarded by most other animals. Scavengers might be described as the junkmen of the natural world. Core C of this unit will deal with other aspects of the junk and junkmen of the world.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
.	Students should:
three questions and anticipate a variety esponses and answers. The student answer corrected or modified at this point. The e meant only to be introductory in nature.	
'T WE SEE A LOT OF DEAD ANIMALS LYING ON THE GROUND?	--respond, "They don't live here," "We don't look for them," "I don't know."
PPENS TO DEAD ANIMALS?	--respond, "I don't know," "Something ate them."
N'T DEAD ANIMALS PILING UP OUTSIDE?	--respond, "I don't know," "They rot away."
OOK AT SOME SLIDES THA MIGHT GIVE US UES.	
e 4-14 and say:	
YOU SEE IN THIS SLIDE?	--describe the scene in their own words, pointing out the dead animal and the bird that is eating the dead animal.
ES THE PICTURE TELL US HAPPENS TO SOME IMALS?	--respond, "They get eaten by other animals."
YONE KNOW WHAT WE CALL THINGS THAT EAT EAD THINGS?	--respond, "Cannibals," "I don't know."
e word scavenger to your students at this ting it on the chalkboard. Explain that word we will use to describe animals that at things that are usually discarded by nimals. Scavengers might be described as of the natural world. Core C of this unit th other aspects of the junk and junkmen	

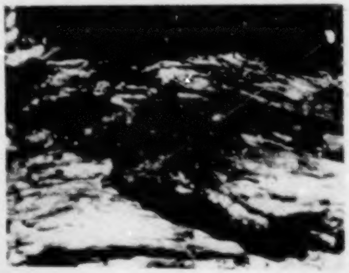
MATERIALS	TEACHING STRATEGIES
Slide 4-15 	After developing an initial understanding of the word scavenger and discussing the scene in Slide 4-14 for as long as students show interest, project Slide 4-15 and ask: WHAT DO YOU SEE IN THIS PICTURE? WHAT IS THE SCAVENGER IN THIS PICTURE? WHAT DOES A SCAVENGER DO?
Slide 4-16 	Now project Slide 4-16 and ask: WHAT ANIMAL DO YOU SEE IN THIS PICTURE? WHAT IS IT DOING? WHAT WOULD YOU CALL HIM? WHY?
Slide 4-17 	Then project Slide 4-17 and ask: WHAT DO WE SEE IN THIS PICTURE? CAN AN ANT EAT A LOT OF DEAD THINGS? WHY NOT? CAN A WHOLE HILL OF ANTS EAT A LOT? WHY? WOULD ALL THE ANTS IN OUR CITY EAT A LOT OF DEAD THINGS?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
an initial understanding of the word scussing the scene in Slide 4-14 tudents show interest, project Slide	
SEE IN THIS PICTURE?	--respond, "A bug," "A beetle," "A scavenger that is eating on a dead body."
SCAVENGER IN THIS PICTURE?	--respond, "The bug," "The beetle."
SCAVENGER DO?	--respond, "Eats things that others usually do not."
e 4-16 and ask:	
DO YOU SEE IN THIS PICTURE?	--respond, "An ant."
DOING?	--respond, "Carrying a big piece of food."
YOU CALL HIM?	--respond, "A scavenger," "A worker."
	--give a working definition of a scavenger and relate how an ant fits the definition.
le 4-17 and ask:	
EE IN THIS PICTURE?	--respond, "An anthill."
AT A LOT OF DEAD THINGS?	--respond, "No."
	--respond, "It is too small."
HILL OF ANTS EAT A LOT?	--probably respond, "Yes."
	--respond, "There are so many of them."
E ANTS IN OUR CITY EAT A LOT OF	--infer, "Probably," "Yes," "I don't know."

ACTIVITY
4-8

MATERIALS

Slide 4-18



Slide 4-19

Slide 4-20

TEACHING STRATEGIES

Project Slide 4-18 and ask:

WHAT DO YOU SEE HERE?

DOES ANYTHING EAT LOGS?

WHAT IS HAPPENING TO THE LOG?

WHAT IS CAUSING THE LOG TO CHANGE?

DO MOST ANIMALS EAT LOGS?

WHAT WOULD YOU CALL THESE "WORMS" AND "BUGS" THAT DO?

Now introduce the word "decompose" to your students and write it on the chalkboard. Explain that decompose means to break apart. Point out that as the worms and bugs eat the log, they break it apart, and we say it decomposes. Explain that in addition to calling some organisms scavengers, we might also refer to some of them as decomposers.

After introducing the word, project Slide 4-19 and ask:

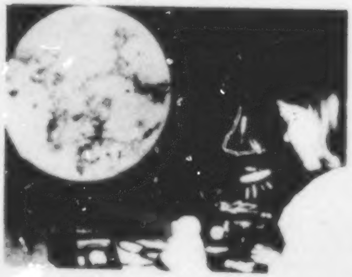
WHAT DO YOU SEE IN THIS PICTURE?

IS IT BEING DECOMPOSED?

Project Slide 4-20 and say:

THIS SLIDE SHOWS A CLOSE-UP OF THE UNDERSIDE OF THE BOARD. HOW IS THIS DIFFERENT FROM WHAT YOU SAW IN THE LAST SLIDE?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
de 4-18 and ask:	Students should:
O YOU SEE HERE?	--respond, "A log."
NYTHING EAT LOGS?	--express doubt that anything eats logs and respond, "No." Someone may say, "Termites do."
S HAPPENING TO THE LOG?	--respond, "It looks funny," "Rotten," "It's disappearing."
S CAUSING THE LOG TO CHANGE?	--infer, "Probably the worms and bugs," "It's rotting."
T ANIMALS EAT LOGS?	--respond, "No."
OULD YOU CALL THESE "WORMS" AND "BUGS" D?	--respond, "Scavengers," "Termites."
e the word "decompose" to your students t on the chalkboard. Explain that decompose eak apart. Point out that as the worms t the log, they break it apart, and we say s. Explain that in addition to calling some cavengers, we might also refer to some of mposers.	
ucing the word, project Slide 4-19 and ask:	
YOU SEE IN THIS PICTURE?	--respond, "A board."
EING DECOMPOSED?	--respond, "No," "Doesn't look like it."
e 4-20 and say:	
IDE SHOWS A CLOSE-UP OF THE UNDERSIDE OF RD. HOW IS THIS DIFFERENT FROM WHAT YOU THE LAST SLIDE?	--observe and respond, "There are bugs on it," "It's rotten."

MATERIALS	TEACHING STRATEGIES
	IS IT BEING DECOMPOSED? WHAT DOES DECOMPOSE MEAN? DO YOU SEE ANY SCAVENGERS IN THIS PICTURE?
Slide 4-21 	Now project Slide 4-21 and say: WHAT DO YOU SEE IN THIS PICTURE? Point to the part of the picture identifying what is being viewed under the microscope and ask: WHAT DO YOU SUPPOSE THESE THINGS ARE? Then say: EARLIER WE STUDIED SOME VERY SMALL LIVING THINGS THAT ARE TOO SMALL TO SEE WITHOUT A MICROSCOPE. WHAT DID WE CALL THEM? If students do not recall the word "microbe," refer them back to one of the activities in Unit II involving microbes and ask what the tiny things were in the activity. Then say: MANY MICROBES BREAK THINGS APART BY EATING THEM. MICROBES THAT DO THIS ARE DECOMPOSERS. CAN WE SEE ALL DECOMPOSERS?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
NG DECOMPOSED?	--respond, "Yes."
DECOMPOSE MEAN?	--give a reasonable definition of decomposers in their own words, such as, "To break apart," "To rot."
ANY SCAVENGERS IN THIS PICTURE?	--respond, "Yes," "The bugs," etc.
de 4-21 and say:	
U SEE IN THIS PICTURE?	--observe the slide and describe the scene, identifying the person, the microscope, and something being viewed through the microscope.
rt of the picture identifying what is der the microscope and ask:	
U SUPPOSE THESE THINGS ARE?	--speculate about the nature of the microbes. They might guess scavengers or decomposers, "Bad microbes," "Germs that make people sick."
STUDIED SOME VERY SMALL LIVING T ARE TOO SMALL TO SEE WITHOUT A . WHAT DID WE CALL THEM?	--recall "Microbes," "Germs."
not recall the word "microbe," refer them the activities in Unit II involving what the tiny things were in the	
BES BREAK THINGS APART BY EATING ROBES THAT DO THIS ARE DECOMPOSERS.	
ALL DECOMPOSERS?	--infer, "No," "They're too small."

ACTIVITY
4-8

MATERIALS

TEACHING STRATEGIES

Then say:

> SOME DECOMPOSERS ARE LARGE AND SOME ARE SO SMALL WE CANNOT SEE THEM WITHOUT A MICROSCOPE. WE WILL BE STUDYING SOME OF THESE IN OUR NEXT ACTIVITIES.

Conclude by asking:

> WHY AREN'T DEAD ANIMALS PILING UP ALL AROUND US?

> WHO MIGHT EAT A DEAD HAWK?

Do not be concerned about an absolute answer here since it will be asked at the end of this core.

CHANG

See Change of Pacer 10.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
ECOMPOSERS ARE LARGE AND SOME ARE SO WE CANNOT SEE THEM WITHOUT A MICROSCOPE. L BE STUDYING SOME OF THESE IN OUR NEXT TIES.	
asking:	
EN'T DEAD ANIMALS PILING UP ALL AROUND US?	--respond, "Things are eating them," "They are being decomposed," "They're rotting away."
GHT EAT A DEAD HAWK?	--respond, "Bugs," "Worms," "Ants," "Microbes."
ncerned about an absolute answer here since sked at the end of this core.	
	Upon completion of this activity, each student should, as a minimum: *--describe in his own words a scavenger and a decomposer* *--be able to say why dead animals aren't piling up.*
f Pacer 10.	

CHANGE OF PACER

UNIT IV, CORE B

ACTIVITY 4-8

Activity name suggested by class:

Teacher____________________

BSCS USE: Post___ Tally___ Rev___

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s)______________ Comment:

Specific Questions:

12. Did students understand why dead animals aren't piling up? ☐ Yes ☐ No Comment:

13. Did students understand that the role of scavengers is to break down dead things into parts that can be reused? ☐ No ☐ Yes
If yes, what evidence do you have of this understanding?

BSCS Evaluation:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

11. Your rating of this activity:

☐ Worthwhile --keep as is

☐ Of value--needs the revision suggested

☐ Worth salvaging--make major changes described

☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s)_______________ Comment:

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12. Did students understand why dead animals aren't piling up? ☐ Yes ☐ No Comment:

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If yes, what evidence do you have of this understanding?

BSCS Evaluation: EMH Feedback Form 1d

Side A

BSCS Evaluation:

Teacher ____________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff (we will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

2. Develop an understanding of cycling and appreciate the cycling relationship of the materials and organisms in the environment.

3. Recognize the role of decomposers in the cycling process.

Core B Objectives for the Student:

2. Discover environmental requirements of microbes and other decomposers.

ENVIRONMENTAL THEME:

Interrelationships of Environmental Components, Complementarity of Organisms and Environment, Cyclic Nature of Processes

INQUIRY SKILLS:

Associating, Describing

PROBLEM-SOLVING SKILLS:

Experimenting

PRACTICAL APPLICATION

Caring for Another Classroom "Pet"

Activity 4-9. Pill Bug Paradise and Worm Wonderland

These activities will give students the opportunity to view some decomposers in action, while reinforcing the idea of the breakdown of organic matter. In addition,

CTIVITY

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. Develop an understanding of cycling and appreciate the cycling relationshi of the materials and organisms in the environment.

. Recognize the role of decomposers in the cycling process.

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AL THEME:
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Nature of Processes

LLS:
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VING SKILLS:
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PPLICATION
for Another Classroom "Pet"

ll Bug Paradise and Worm Wonderland

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BSCS

UNIT IV. TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT

CORE B. DECOMPOSERS IN MY ENVIRONMENT

ACTIVITY 4-9. PILL BUG PARADISE AND WORM WONDERLAND

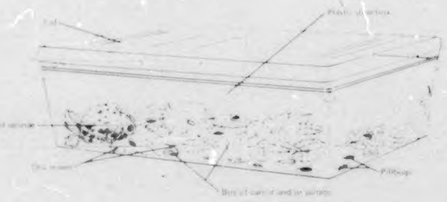
During this activity, each student should:

--assist in collecting pill bugs or earthworms
--participate in making a pill bug or worm environment

MATERIALS

*Pill bugs, 25 to 50
*Covered plastic shoe box or
  fish aquarium
*Leaves (dried)
*1 Small sponge (test tube plug)
*Pieces of potato and carrot

Diagram 4-4



*Not furnished in materials kit

TEACHING STRATEGIES

students will have some concrete experiences of caring for a living thing that they may not normally have contact with, or even be aware of. It is not necessary to complete both parts of this activity; having one sort of animal in the classroom will fulfill the objectives. However, students will probably be interested in both activities.

Part I. Pill Bug Paradise

Teacher Preparation:

Without pill bugs, this activity cannot be used. Fortunately, these land isopods are very common over much of the United States except during the coldest months of the year. They can be collected in most areas by searching under rocks, logs, old boards, in wood piles, near foundations of a house, etc., wherever they are shaded from the light and have adequate moisture.

Involve your students in collecting the bugs a day or two before you plan to begin the activity. The students can also assist in setting up the pill bug box as follows. (See Diagram 4-4.)

1. Scatter a handful of dead leaves or bark chips on the bottom of the shoe box. (A very thin layer of forest litter or the debris from a pile of firewood containing bits of wood and bark could be added first, but is not necessary.)

2. Add a small moistened sponge.

3. Add pill bugs.

4. Place a few small bits of carrot in and on the leaves.

5. Cover the box.

TEACHING STRATEGIES

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could be added first, but is not necessary.)

small moistened sponge.

ill bugs.

a few small bits of carrot in and on
eaves.

the box.

ANTICIPATED STUDENT BEHAVIORS

During this activity, each student should:

- *--observe and record changes in the pill bug or warm environment*
- *--participate in the discussion of the pill bug or worm and its environment.*

The bugs should do quite well under these conditions. Keep air circulation to a minimum and caution the students that the sponge must be kept moist or the pill bugs might die. It might be best to assign someone to moisten the sponge each day. Bits of carrots or potatoes could be added from time to time as they are consumed.

WOR
TIM

After the students have set up the pill bug box, mention to them that they will be expected to observe the activity of the pill bugs every day for a week. Some observable changes in the leaves indicating that they are being eaten should occur during this week. Holes will appear, and the leaves will eventually be consumed. No formal records will be kept for this activity since the compost activity will be going on at the same time. Simply allow students to have fun watching the pill bugs each day. Focus their attention on the dried leaves, carrots, and potatoes. Ask them to watch for

WAITING TI

ABOUT 1 WEEK

TEACHING STRATEGIES

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tion to a minimum and caution the
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die. It might be best to assign some-
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focus their attention on the dried
and potatoes. Ask them to watch for

WAITING TIME

ABOUT 1 WEEK LATER

ANTICIPATED STUDENT BEHAVIORS

MATERIALS

TEACHING STRATEGIES

any changes. When they have noted the changes discuss the results as follows:

WHAT HAS HAPPENED TO THE LEAVES?

WHAT HAS HAPPENED TO THE CARROTS AND POTATOES?

WHAT DO WE CALL ORGANISMS THAT BREAKDOWN THINGS LIKE THIS?

Accept decomposers and scavengers as the best answers and review these words if the students do not mention them. Write the words on the chalkboard.

WHAT ARE SOME OTHER DECOMPOSERS, OR SCAVENGERS?

If other decomposers and scavengers are not mentioned, remind them of Slides 4-14 through 4-21 in Activity 4-8.

The pill bug box can be dismantled at this time and the pill bugs released outside, or they may become another set of classroom pets that can be kept with minimal effort. Periodically add more leaves, small pieces of potato or carrot, and small amounts of moisture to their container.

Students may wish to set up their own individual pill bug cultures, using small containers such as baby food jars. Other kinds of organic matter could be added and observations made of the effect the pill bugs have on the material.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
. When they have noted the changes discuss as follows:	
AS HAPPENED TO THE LEAVES?	--respond, "They have changed," "The pill bugs have eaten parts of them."
AS HAPPENED TO THE CARROTS AND POTATOES?	--indicate that these have been partially consumed also.
D WE CALL ORGANISMS THAT BREAKDOWN THINGS HIS?	--respond, "Decomposers," "Scavengers."
nposers and scavengers as the best answers these words if the students do not mention e the words on the chalkboard.	
RE SOME OTHER DECOMPOSERS, OR SCAVENGERS?	--recall previous experiences, relate slides viewed earlier, and say, "Worms," "Microbes," "Fungi," "Ants," and so on.
composers and scavengers are not mentioned, of Slides 4-14 through 4-21 in Activity 4-8.	
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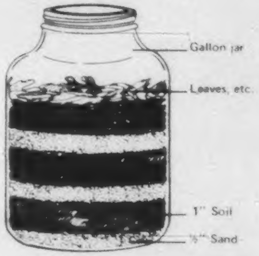
MATERIALS

*Spade or fork
*Widemouthed gallon jar
*Soil
*Sand
*Several earthworms (about 10)
*Decaying leaves
*Lettuce
*Grass
*Cornmeal
*Sheet of black paper
*Tape

Diagram 4-5



Worm house

*Not furnished in materials kit

TEACHING STRATEGIES

Part II. Worm Wonderland

Teacher Preparation

Worms can be collected in most places by digging in moist soil. In winter you will have to dig deeper than in summer. A gardener's compost pile may be a good source of worms.

Involve your students in collecting the worms before you plan to start the activity. The students can also set up the worm farm as follows:

1. Fill the gallon jar to within a few inches of the top with alternating layers of one inch of soil and one-half inch of sand. (See Diagram 4-5.) Finish with a layer of soil on top.
2. Place the worms and decaying leaves on the top.
3. Keep soil and sand moist but not too wet.
4. Wrap the black paper around the jar and tape in place. Leave this on for two weeks, removing only for observation.
5. Add small amounts of lettuce, grass, and cornmeal occasionally.

Have students observe the worm farm regularly. Some changes they should notice are: the soil and sand get mixed up together; leaves may disappear; bits of food get eaten.

After the students have observed changes, ask:

WHAT HAS HAPPENED TO THE LEAVES?

TEACHING STRATEGIES

Wonderland

tion

llected in most places by digging in
winter you will have to dig deeper than
rdener's compost pile may be a good

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as follows:

gallon jar to within a few inches of
th alternating layers of one inch of
ne-half inch of sand. (See Diagram
ish with a layer of soil on top.

worms and decaying leaves on the

and sand moist but not too wet.

lack paper around the jar and
ace. Leave this on for two weeks,
nly for observation.

amounts of lettuce, grass, and
ccasionally.

serve the worm farm regularly. Some
uld notice are: the soil and sand
ether; leaves may disappear; bits of

ts have observed changes, ask:

PPENED TO THE LEAVES?

ANTICIPATED STUDENT BEHAVIORS

Students should:

--respond, "Disappeared," "Worms have eaten them."

ACTIVITY
4-9

MATERIALS

TEACHING STRATEGIES

WHAT HAS HAPPENED TO THE (LETTUCE)?

WHAT DO WE CALL ORGANISMS THAT BREAK DOWN THINGS LIKE THIS?

Discuss with students the good earthworms do, breaking down dead material and aerating and mixing the soil.

CHAN

See Change of Pacer 11.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
HAS HAPPENED TO THE (LETTUCE)?	--respond, "Some is gone," "Eaten."
DO WE CALL ORGANISMS THAT BREAK DOWN S LIKE THIS?	--respond, "Decomposers," "Scavengers."
th students the good earthworms do, breaking material and aerating and mixing the soil.	
	Upon completion of this activity, each student should, as a minimum: *--have observed a change in the decomposers' environment* *--be able to state that the pill bugs or worms are decomposers, or scavengers.*
of Pacer 11.	

CHANGE OF PACER

UNIT IV, CORE B
ACTIVITY 4-9

Activity name suggested by class:

Teacher____________________

BSCS USE: Post___ Tally___ Rev___

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s)______________ Comment:

Specific Questions:

12. Did students recognize pill bugs as decomposers or scavengers? ☐ Yes ☐ No
Comment:

13. What was students' reaction to observing the pill bugs? Comment:

BSCS Evaluation:

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s)______________ Comment:

Specific Questions:

12. Did students recognize pill bugs as decomposers or scavengers? ☐ Yes ☐ No
Comment:

13. What was students' reaction to observing the pill bugs? Comment:

Teacher ______________________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

BSCS Evaluation:

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff (we will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

BSCS Evaluation: EMH Feedback Form 1d

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

2. Develop an understanding of cycling and appreciate the cycling relationship of the materials and organisms in the environment.

3. Recognize the role of decomposers in the cycling process.

Core B Objectives for the Student:

1. Recognize the role microbes play in the decomposition process.

3. Appreciate how knowledge of decomposers can improve man's environment.

4. Conclude that microbes contribute to man's well-being as well as pose problems for man.

ENVIRONMENTAL THEME:

Interrelationship of Environmental Components, Cyclic Nature of Processes

INQUIRY SKILLS:

Observing, Describing, Comparing

PROBLEM-SOLVING SKILLS:

Recording Data, Discussion and Treatment of Group Data

PRACTICAL APPLICATION:

Learning Gardening Skills, Value of Natural Fertilizers

ACTIVITY

Goals for the Student:

2. Develop an understanding of cycling and appreciate the cycling relationship of the materials and organisms in the environment.

3. Recognize the role of decomposers in the cycling process.

Objectives for the Student:

. Recognize the role microbes play in the decomposition process.

3. Appreciate how knowledge of decomposers can improve man's environment.

. Conclude that microbes contribute to man's well-being as well as pose problems for man.

AL THEME:
elationship of Environmental Components,
Nature of Processes

LLS:
ing, Describing, Comparing

VING SKILLS:
ing Data, Discussion and Treatment of
Data

PPLICATION:
ng Gardening Skills, Value of Natural
izers

BSCS

UNIT IV.	TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT
CORE B.	DECOMPOSERS IN MY ENVIRONMENT
ACTIVITY 4-10.	TALKING ROT

MATERIALS

Compost piles
Worksheet 4-0 (partially completed)
Equal-arm balance kits

TEACHING STRATEGIES

Activity 4-10. Talking Rot

This activity will conclude the observations of the compost piles set up in Activity 4-0. Students will have the opportunity to increase their understanding of decomposition and composting. These ideas should relate to man's ability to use his knowledge of decomposition t improve his environment; they should also relate to the student's ability to improve his own environment through a knowledge of decomposition.

Begin this activity by having students observe the compost piles, including weighing the two objects, and make a final description on Worksheet 4-0. (REMINDER: Keep the compost and continue to add water as necessary as the compost will be used in Activities 4-11 and 4-12.) Discuss the changes that have occurred by saying:

> LET'S LOOK AT OUR COMPOST RECORDS. HAS THE PILE CHANGED SINCE WE STARTED?
>
> HOW HAS IT CHANGED?
>
> HOW HAS THE (item) CHANGED?

Repeat this question for a number of the organic materials in the compost.

> WHAT DOES THE WORD "DECOMPOSE" MEAN?
>
> WHAT HAS BEEN MAKING THE THINGS IN OUR COMPOST PILE DECOMPOSE?
>
> > If students do not suggest microbes, ask:
> >
> > CAN WE SEE THE DECOMPOSERS IN OUR COMPOST PILE?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
0. Talking Rot *y will conclude the observations of the comet up in Activity 4-0. Students will have ity to increase their understanding of n and composting. These ideas should relate lity to use his knowledge of decomposition to environment; they should also relate to the ility to improve his own environment through of decomposition.*	*During this activity, each student should:* *--define compost as a mixture of decaying materials* *--relate the idea of composting to fertilizers and gardening* *--associate decomposition of dead material with the soil-building process* *--begin to develop a concept of biodegradability and nonbiodegradability.*
ctivity by having students observe the s, including weighing the two objects, and description on Worksheet 4-0. (REMINDER: post and continue to add water as necessary st will be used in Activities 4-11 and 4-12.) changes that have occurred by saying:	Students should:
OOK AT OUR COMPOST RECORDS. HAS THE ANGED SINCE WE STARTED?	--examine Worksheet 4-0 and respond, "Yes."
IT CHANGED?	--respond, "It stinks," "It's rotten."
THE (item) CHANGED?	--respond appropriately for each material.
question for a number of the organic the compost.	
ES THE WORD "DECOMPOSE" MEAN?	--recall Activity 4-8 and respond, "To break apart," "Rot away."
S BEEN MAKING THE THINGS IN OUR COMPOST COMPOSE?	--recall, "Scavengers," "Decomposers," "Microbes."
students do not suggest microbes, ask:	
N WE SEE THE DECOMPOSERS IN OUR MPOST PILE?	--respond, "No."

MATERIALS

TEACHING STRATEGIES

WHAT DO WE CALL LIVING THINGS THAT ARE TOO SMALL TO BE SEEN WITHOUT A MICROSCOPE?

WHERE DO THE MICROBES COME FROM THAT DECOMPOSE THE COMPOST HEAP?

WHY DO YOU THINK SOIL IS A GOOD PLACE TO PUT THINGS TO DECOMPOSE?

WHERE ARE THE THINGS GOING THAT ARE BEING DECOMPOSED BY THE MICROBES?

IF YOU ADD THINGS TO THE SOIL THAT DECOMPOSE, WHAT DOES THIS DO TO THE AMOUNT OF SOIL IN THE BOX?

DOES ANYONE KNOW ANYBODY WHO HAS A COMPOST PILE IN HIS YARD?

WHY DO YOU THINK PEOPLE WOULD BUILD COMPOST PILES?

If no one says yes or that they don't know why compost piles are built, tell them that compost piles are built to use in gardens as fertilizers. (If you invited a gardener or compost user to visit your class as a Change of Pacer, ask your students to recall the visit and what was said.)

WHY IS COMPOST ADDED TO GARDENS?

Tell the students that one of the reasons compost is added to the soil is to enrich and to fertilize it, and that composting helps the soil retain moisture.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
WE CALL LIVING THINGS THAT ARE LL TO BE SEEN WITHOUT A MICROSCOPE?	--respond, "Microbes," "Germs."
MICROBES COME FROM THAT DECOMPOSE HEAP?	--recall, "Microbes are everywhere," "In the soil already," etc.
HINK SOIL IS A GOOD PLACE TO PUT COMPOSE?	--guess, "Lots of decomposing microbes."
E THINGS GOING THAT ARE BEING Y THE MICROBES?	--respond, "Into the soil," "Are rotting away."
HINGS TO THE SOIL THAT DECOMPOSE, IS DO TO THE AMOUNT OF SOIL IN	--infer that it makes more soil.
KNOW ANYBODY WHO HAS A COMPOST YARD?	--respond, "No," "Yes."
HINK PEOPLE WOULD BUILD COMPOST	--respond, "To get rid of garbage," "Don't know," "For fertilizer."
s or that they don't know why compost tell them that compost piles are built as fertilizers. (If you invited a st user to visit your class as a Change students to recall the visit and what	
T ADDED TO GARDENS?	--respond, "Because it's like a fertilizer," "It helps the soil," "It makes the soil better."
that one of the reasons compost is is to enrich and to fertilize it, g helps the soil retain moisture.	

ACTIVITY
4-10

MATERIALS

TEACHING STRATEGIES

WHAT DO YOU THINK HAPPENS TO THE BITS OF DECOMPOSED THINGS ONCE THEY ARE IN THE SOIL?

BITS OF DECOMPOSED LIVING THINGS ARE USED BY PLANTS TO HELP THEM GROW.

At this point you could refer to *The Long Journey*, and explain that microbes broke down the hawk's droppings before the body building material was used by the grass.

Direct the students' attention back to the compost pile and their completed worksheets.

WHAT THINGS HAVE DECOMPOSED OR ARE DECOMPOSING?

WHY ARE THE GLASS AND PLASTIC THE SAME AS WHEN WE PUT THEM IN OUR COMPOST?

WE SAY THAT THINGS THAT CAN BE BROKEN DOWN BY DECOMPOSING MICROBES ARE BIODEGRADABLE.

Write the word "biodegradable" on the chalkboard.

HOW MANY OF YOU HAVE EVER HEARD THE WORD "BIODEGRADABLE" BEFORE?

WHERE HAVE YOU SEEN THIS WORD BEFORE?

WHAT THINGS IN OUR COMPOST PILE WERE BIODEGRADABLE, WERE DECOMPOSED BY MICROBES?

WHAT THINGS IN OUR COMPOST PILE WERE NOT DECOMPOSED BY MICROBES?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
DO YOU THINK HAPPENS TO THE BITS OF POSED THINGS ONCE THEY ARE IN THE SOIL?	--guess, "Used by plants," "Eaten by microbes," "Nothing," etc.
OF DECOMPOSED LIVING THINGS ARE USED BY S TO HELP THEM GROW.	
int you could refer to *The Long Journey*, and t microbes broke down the hawk's droppings body building material was used by the grass.	
students' attention back to the compost pile ompleted worksheets.	
THINGS HAVE DECOMPOSED OR ARE DECOMPOSING?	--after inspecting their worksheets and the pile, indicate those things that are undergoing decomposition.
E THE GLASS AND PLASTIC THE SAME AS WHEN THEM IN OUR COMPOST?	--respond, "They didn't break down," "Microbes can't eat them," "They're too hard."
THAT THINGS THAT CAN BE BROKEN DOWN OMPOSING MICROBES ARE BIODEGRADABLE.	
ord "biodegradable" on the chalkboard.	
NY OF YOU HAVE EVER HEARD THE WORD GRADABLE" BEFORE?	--raise their hands.
HAVE YOU SEEN THIS WORD BEFORE?	--suggest such places as on TV, on soap or detergent boxes.
HINGS IN OUR COMPOST PILE WERE RADABLE, WERE DECOMPOSED BY MICROBES?	--recall, "Orange peel," "Grass," etc.
HINGS IN OUR COMPOST PILE WERE NOT OSED BY MICROBES?	--recall, "Plastic," "Glass," etc.

MATERIALS

TEACHING STRATEGIES

WE CALL THESE THINGS NONBIODEGRADABLE.

Write the word "nonbiodegradable" on the chalkboard.

DO THINGS THAT DECOMPOSE OR THINGS THAT DON'T DECOMPOSE DO MORE GOOD TO THE SOIL?

TOMORROW WE WILL USE OUR COMPOST TO GROW PLANTS, AND THEN WE WILL SEE IF THE THINGS THAT DECOMPOSED MADE THE SOIL RICH.

Collect all student copies of Worksheet 4-0.

Turn to the Development of Experience in Observation page of the Student Record of Progress and use the worksheets to rate each student's success in making appropriate observations. Recalling the amount of assistance you provided, also rate whether each student could record results on his own, required help, or made no meaningful record. Plan to provide special help to your least successful students as they complete the worksheets in Activities 4-13 and 4-14. Send Worksheet 4-0 and a copy of your ratings to BSCS.

b

TEACHING STRATEGIES

SE THINGS NONBIODEGRADABLE.

nonbiodegradable" on the chalkboard.

HAT DECOMPOSE OR THINGS THAT DON'T
O MORE GOOD TO THE SOIL?

WILL USE OUR COMPOST TO GROW
THEN WE WILL SEE IF THE THINGS
OSED MADE THE SOIL RICH.

ent copies of Worksheet 4-0.

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ent Record of Progress and use the
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rvations. Recalling the amount of
rovided, also rate whether each student
ilts on his own, required help, or
il record. Plan to provide special
st successful students as they complete
n Activities 4-13 and 4-14. Send
d a copy of your ratings to BSCS.

ANTICIPATED STUDENT BEHAVIORS

Students should:

--infer that things that decompose make the soil richer.

Upon completion of this activity, each student should, as a minimum:

- *--be able to state that some things are broken down in compost piles by decomposers*
- *--be able to state that some things are not decomposed*
- *--be able to say that microbes decompose things in the compost piles.*

ACTIVITY
4-10

MATERIALS

TEACHING STRATEGIES

See Change of Pacers 12 and 13.

ACTIVITY
4-10

MATERIALS

TEACHING STRATEGIES

See Change of Pacers 12 and 13.

CHAN

TEACHING STRATEGIES

ANTICIPATED STUDENT BEHAVIORS

CHANGE OF PACER

of Pacers 12 and 13.

ACTIVITY 4-10

Activity name suggested by class: **Teacher**______________________

BSCS USE: Post___ Tally___ Rev___

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO:	1/4	1/2	3/4	ALL
HIGH INTEREST						
MODERATE INTEREST OR INDIFFERENCE						
RESISTANCE OR DISLIKE						

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is
☐ Of value--needs the revision suggested
☐ Worth salvaging--make major changes described
☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s)______________ Comment:

Specific Questions:

12. How many students realized that compost is fertilizer? ☐ None ☐ 1/4 ☐ 1/2 ☐ 3/4 ☐ All Evidence for this judgment:

13. How many students had heard the word "biodegradable" before?
None ☐ 1/4 ☐ 1/2 ☐ 3/4 ☐ All Comment:

BSCS Evaluation:

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

11. Your rating of this activity:
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Specific Questions:

12. How many students realized that compost is fertilizer? ☐ None ☐ 1/4 ☐ 1/2 ☐ 3/4 ☐ All Evidence for this judgment:

13. How many students had heard the word "biodegradable" before?
None ☐ 1/4 ☐ 1/2 ☐ 3/4 ☐ All Comment:

14. Before mailing in this feedback sheet, ask each student what the word "biodegradable" means. How many could give some indication of its relation to decomposers? ☐ None ☐ 1/4 ☐ 1/2 ☐ 3/4 ☐ All Comment:

BSCS Evaluation: EMH Feedback Form 1d

Side A

Teacher ____________________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

BSCS Evaluation:

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff (we will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

BSCS Evaluation: EMH Feedback Form 1d

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

2. Develop an understanding of cycling and appreciate the cycling relationship of materials and organisms in the environment.

3. Recognize the role of decomposers in the cycling process.

Core B Objectives for the Student:

1. Recognize the role microbes play in the decomposition process.

3. Appreciate how knowledge of decomposers can improve man's environment.

4. Conclude that microbes contribute to man's well-being as well as pose problems for man.

ENVIRONMENTAL THEME:

Interrelationships of Environmental Components, Cyclic Nature of Processes

INQUIRY SKILLS:

Observing, Applying

PROBLEM-SOLVING SKILLS:

Experimenting

PRACTICAL APPLICATION

Learning Garden Skills, Practice in Following Directions

CTIVITY

oals for the Student:

. Develop an understanding of cycling and appreciate the cycling relationship of materials and organisms in the environment.

. Recognize the role of decomposers in the cycling process.

Objectives for the Student:

. Recognize the role microbes play in the decomposition process.

. Appreciate how knowledge of decomposers can improve man's environment.

. Conclude that microbes contribute to man's well-being as well as pose problems for man.

AL THEME:
elationships of Environmental Components,
Nature of Processes

LLS:
ing, Applying

VING SKILLS:
menting

PPLICATION
ng Garden Skills, Practice in
ing Directions

BSCS

UNIT IV.	TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT
CORE B.	DECOMPOSERS IN MY ENVIRONMENT
ACTIVITY 4-11.	PLANTING IN COMPOST

ACTIVITY 4-11

MATERIALS

Seeds, 1 package each of:
  Marigolds
  Beans
2 Peat pots per student
*Compost piles from Activity 4-0
*Commercial planting soil
*2 Cleaned 1/2-pint milk cartons per student
*2 Popsicle sticks or pieces of masking tape per student
*3 Marking pencils
*Trowels, several

*Not furnished in materials kit

TEACHING STRATEGIES

Activity 4-11. Planting in Compost

The concrete experience of planting seeds in compost in this activity reinforces the idea that decomposed materials enrich the soil and help plants to grow.

Teacher Preparation:

1. This activity requires compost that has been well decomposed. If your compost piles have not been set up long enough, this activity could be postponed to the end of Core B.

2. If students enjoy planting the seeds, they might wish to try other sorts of seeds. One suggestion is the sensitive plant, but it is rather delicate and may not be as successful as marigolds and beans.

3. Be sure to leave enough compost for three tablespoons per pair of students for Activity 4-12.

Begin by saying:

WHAT HAPPENED TO THE GRASS AND PEELINGS WE PUT IN OUR COMPOST PILE?

WHAT BROKE DOWN THESE THINGS?

WHAT HAPPENED TO THE BITS OF PEELINGS AFTER THEY WERE BROKEN DOWN?

HOW DO THESE PIECES HELP THE GRASS AND OTHER PLANTS GROWING IN THE SOIL?

SINCE BITS OF THE COMPOST THAT WERE PART OF LIVING THINGS ARE BEING USED BY PLANTS, IT IS BEING USED OVER AGAIN.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
1. Planting in Compost	*During this activity, each student should:*
experience of planting seeds in compost in reinforces the idea that decomposed rich the soil and help plants to grow.	*--review the concepts involved in compost* *--plant two sorts of seeds in compost from their piles.*
ration:	
tivity requires compost that has been well sed. If your compost piles have not been long enough, this activity could be post- o the end of Core B.	
ents enjoy planting the seeds, they might try other sorts of seeds. One suggestion sensitive plant, but it is rather delicate not be as successful as marigolds and	
to leave enough compost for three table- per pair of students for Activity 4-12.	
ng:	Students should:
PENED TO THE GRASS AND PEELINGS WE UR COMPOST PILE?	--recall, "Decomposed," "Rotted," etc.
KE DOWN THESE THINGS?	--recall, "Microbes," "Decomposers."
PENED TO THE BITS OF PEELINGS AFTER E BROKEN DOWN?	--recall, "Went into the soil."
HESE PIECES HELP THE GRASS AND OTHER ROWING IN THE SOIL?	--reply, "It fertilizes them," "Helps them to grow," "Plants use them to make food."
TS OF THE COMPOST THAT WERE PART OF HINGS ARE BEING USED BY PLANTS, IT USED OVER AGAIN.	

MATERIALS

TEACHING STRATEGIES

WHAT IS A WORD THAT MEANS TO USE OVER AGAIN?

WHICH OF THE THINGS WE ADDED TO THE SOIL COULD BE RECYCLED BY PLANTS?

WE ARE GOING TO RECYCLE OUR COMPOST TODAY. HOW CAN WE DO THIS?

WE ARE GOING TO PLANT SEEDS IN OUR COMPOST TO MAKE A MINIGARDEN.

Display the materials to be used for planting. It is suggested that each student plant two different kinds of seeds; two seeds of one kind in each peat pot. Each student will then have two pots and two different kinds of plants. Have the students proceed as follows:

1. Distribute two peat pots and two cleaned, recycled milk cartons to each student.
2. Fill each pot at least three-fourths full with compost. (If there is not enough compost to fill each pot, add natural or potting soil to provide a mixture of one-half soil, one-half compost, pointing out to the students that mixing compost with soil is normally the way compost is used in gardening. Save at least three tablespoons full of moist compost for Activity 4-12. If compost is left over, use this to plant any remaining seeds.)
3. Place one pot in each milk carton. The carton will catch any excess water used in keeping the seedlings moist.
4. Give each student two Popsicle sticks or pieces of masking tape to use as labels.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
RD THAT MEANS TO USE OVER AGAIN?	--recall, "Recycle."
THINGS WE ADDED TO THE SOIL COULD BY PLANTS?	--respond with the things that decomposed, e.g., grass, peelings.
TO RECYCLE OUR COMPOST TODAY. HOW IS?	--infer, "By planting something."
TO PLANT SEEDS IN OUR COMPOST TO ARDEN.	
ials to be used for planting. It is ch student plant two different kinds ds of one kind in each peat pot. Each have two pots and two different kinds the students proceed as follows:	
two peat pots and two cleaned, lk cartons to each student.	
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t in each milk carton. The carton ny excess water used in keeping the oist.	
udent two Popsicle sticks or pieces ape to use as labels.	

MATERIALS

TEACHING STRATEGIES

5. After the pots are filled, distribute two of one kind of seed to each student.

6. Use a Popsicle stick or pencil and make two holes in the compost in one of the pots. The proper planting depth for the seeds used is:
   Marigold, one-fourth inch
   Bean, one inch

7. Place a seed in each hole and loosely pack the compost over the seeds.

8. Water the pot thoroughly, pouring away any water that has soaked through the pot into the milk carton.

9. Write the student's name and the name of the plant on a Popsicle stick or on masking tape and attach it to the pot. (Write the name of the plant seeds on the chalkboard for the students to copy.)

10. Repeat the same procedure with a second kind of seed.

One advantage of the peat pots used in this activity is that the students can put the whole pot, including the plant, in the soil and will not have to transplant the plant. If the student does not plan to plant the pot in his yard, it should eventually be planted in a larger clay pot.

The plants planted in the remaining class compost will need to be replanted later. The sensitive plant grows best in a humid environment. Keep these plants as moist as possible at all times.

TEACHING STRATEGIES

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f seed to each student.

Popsicle stick or pencil and make two
in the compost in one of the pots. The
planting depth for the seeds used is:
rigold, one-fourth inch
an, one inch

a seed in each hole and loosely pack the
t over the seeds.

the pot thoroughly, pouring away any water
as soaked through the pot into the milk
.

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on a Popsicle stick or on masking tape and
it to the pot. (Write the name of the
seeds on the chalkboard for the students
y.)

the same procedure with a second kind of

e of the peat pots used in this activity is
dents can put the whole pot, including the
e soil and will not have to transplant the
he student does not plan to plant the pot
it should eventually be planted in a
pot.

lanted in the remaining class compost will
eplanted later. The sensitive plant grows
hid environment. Keep these plants as
sible at all times.

ANTICIPATED STUDENT BEHAVIORS

MATERIALS

TEACHING STRATEGIES

Ask:

HOW WILL THE COMPOST HELP THE SEEDS TO GROW?

See Change of Pacer 13.

CHANGE OF

TEACHING STRATEGIES

E COMPOST HELP THE SEEDS TO GROW?

CHANGE OF PACER

cer 13.

ANTICIPATED STUDENT BEHAVIORS

Students should:

--respond, "By fertilizing the soil," "It makes the dirt richer," "It helps the soil."

Upon completion of this activity, each student should, as a minimum:

--be able to state that things in the compost from the decomposed materials will help their seeds grow.

ACTIVITY 4-11

Activity name suggested by class:

Teacher____________________

BSCS USE: Post___ Tally___ Rev___

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s)____________ Comment:

Specific Questions:

12. Did any students have difficulty planting seeds? ☐ No ☐ Yes How many?_____
Explain:

13. How did different students react to handling decomposed material for planting?
Comment:

BSCS Evaluation:

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is
☐ Of value--needs the revision suggested
☐ Worth salvaging--make major changes described
☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s)______________ Comment:

Specific Questions:

12. Did any students have difficulty planting seeds? ☐ No ☐ Yes How many?_____
Explain:

13. How did different students react to handling decomposed material for planting?
Comment:

BSCS Evaluation: EMH Feedback Form 1d

Side A

Teacher ____________________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

BSCS Evaluation:

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff (we will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

BSCS Evaluation: EMH Feedback Form 1d

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

2. Develop an understanding of cycling and appreciate the cycling relationship of the materials and organisms in the environment.

3. Recognize the role of decomposers in the cycling process.

Core B Objectives for the Student:

1. Recognize the role microbes play in the decomposition process.

2. Discover environmental requirements of microbes and other decomposers.

ENVIRONMENTAL THEME:

Interrelationship of Environmental Components, Complementarity of Organisms and Environment, Cyclic Nature of Processes, Finiteness of Resources

INQUIRY SKILLS:

Inferring

PROBLEM-SOLVING SKILLS:

Controls, Interpreting Results

PRACTICAL APPLICATION:

Learning to Make Compost, Motor Coordination

CTIVITY

oals for the Student:

. Develop an understanding of cycling and appreciate the cycling relationship of the materials and organisms in the environment.

. Recognize the role of decomposers in the cycling process.

Objectives for the Student:

Recognize the role microbes play in the decomposition process.

. Discover environmental requirements of microbes and other decomposers.

AL THEME:

elationship of Environmental Components,
mentarity of Organisms and Environment,
Nature of Processes, Finiteness of
ces

LLS:

ing

VING SKILLS:

ls, Interpreting Results

PPLICATION:

ng to Make Compost, Motor Coordination

BSCS

UNIT IV.	TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT
CORE B.	DECOMPOSERS IN MY ENVIRONMENT
ACTIVITY 4-12.	COMPOST MICROBES

ACTIVITY
4-12

MATERIALS

- 1 Water pipe per student
- 1 Flask, 250 ml, widemouthed, per pair of students
- 1 Rubber stopper, No. 8, one-hole, per pair of students
- 1 one-fourth inch I.D. Tygon tubing, 12 inches long, per pair of students
- 1 one-fourth inch I.D. Acrylic tubing, 3 inches long, per pair of students
- 1 Carbon dioxide test solution (bromthymol blue) in dropping bottles, per pair of students
- 1 Beaker or baby food jar per pair of students
- 1 Measuring spoon per pair of students
- *Compost from Activity 4-0
- *Water

*Not furnished in materials kit

TEACHING STRATEGIES

Activity 4-12. Compost Microbes

This activity will demonstrate one way that microbes are similar to other living things. It will reinforce the idea that microbes are living organisms and that decomposition occurs through microbial action. In this case the class compost will be the resource of microbial activity.

Teacher Preparation:

Part I.

The success of the rest of this activity depends on the use of a chemical test solution to detect carbon dioxide dissolved in water. A test solution indicates the presence of a certain chemical substance by changing color. Bromthymol blue is a test solution that changes to pale green or yellow in the presence of carbon dioxide.

DO THINGS DECOMPOSE ALL BY THEMSELVES?

WHAT HELPS THINGS DECOMPOSE IN OUR COMPOST PILE?

ARE MICROBES ALIVE?

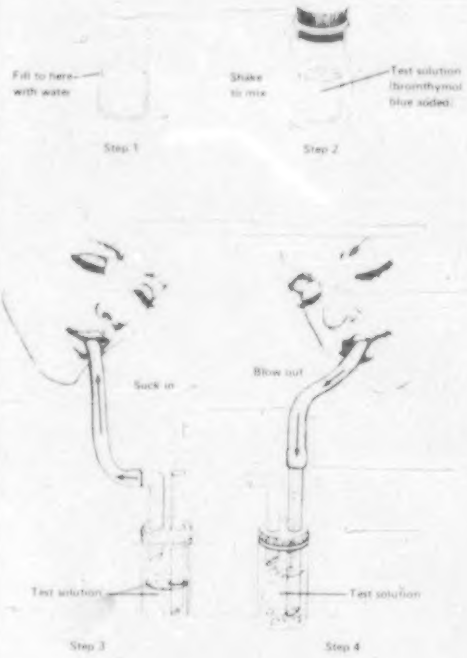
DO MICROBES BREATHE AS WE DO?

PEOPLE BREATHE OUT A GAS CALLED CARBON DIOXIDE. DO YOU THINK MICROBES BREATHE OUT CARBON DIOXIDE, TOO?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
2. Compost Microbes	*During this activity, each student should:*
y will demonstrate one way that microbes *to other living things. It will reinforce* *t microbes are living organisms and that* *n occurs through microbial action. In this* *ss compost will be the resource of microbial*	*--fill and label a water pipe vial with indicator solution* *--exhale and inhale into the indicator solution through a tube* *--observe the change in color of the indicator solution* *--associate the change in indicator solution with the presence of carbon dioxide* *--infer that carbon dioxide is a normal component of exhaled breath* *--observe a color change in the indicator solution made by air from the compost* *--infer that microbes in compost produce carbon dioxide* *--infer that microbes are living organisms.*
aration:	Students should:
of the rest of this activity depends on the nical test solution to detect carbon dioxide water. A test solution indicates the pre- rtain chemical substance by changing color. ue is a test solution that changes to pale ow in the presence of carbon dioxide.	
S DECOMPOSE ALL BY THEMSELVES?	--respond, "No," "They have to be in a compost pile," "Microbes do it."
PS THINGS DECOMPOSE IN OUR COMPOST PILE?	--respond, "Microbes."
OBES ALIVE?	--respond, "Yes," "No," "I don't know."
BES BREATHE AS WE DO?	--respond, "I don't know," "No," "Yes."
REATHE OUT A GAS CALLED CARBON DIOXIDE. HINK MICROBES BREATHE OUT CARBON DIOXIDE,	--predict whether or not microbes breathe out carbon dioxide.

MATERIALS

Diagram 4-6


Fill to here with water
Step 1
Shake to mix
Test solution (bromthymol blue added)
Step 2
Suck in
Blow out
Test solution
Step 3
Test solution
Step 4

TEACHING STRATEGIES

HOW COULD WE FIND OUT IF THE MICROBES PRODUCE CARBON DIOXIDE, TOO?

Discuss the student suggestions for such an experiment. Point out that the class has equipment to do one sort of experiment.

Distribute the materials and direct each student as follows:

1. Fill a water pipe with water up to the mark. Using a medicine dropper, add five to ten drops of the test solution (bromthymol blue) to the water. (See Diagram 4-6.)
2. Swirl the contents gently to mix. Cap the water pipe.
3. Explain that the test solution will change color (blue to pale yellow or green) when there is carbon dioxide present. Tell the students that in order to see how the test solution works they will use it on their own breath first.
4. Attach the flexible tubing to the straight tube that runs below the surface of the test solution. Instruct the students to blow bubbles gently into the solution. In a few moments the solution should change from blue to yellow, indicating the presence of carbon dioxide given off in human breath.

Ask:

DID THE INDICATOR SOLUTION CHANGE COLOR?

TEACHING STRATEGIES

E FIND OUT IF THE MICROBES PRODUCE
IDE, TOO?

ent suggestions for such an experiment.
ne class has equipment to do one sort

aterials and direct each student as

er pipe with water up to the mark.
licine dropper, add five to ten drops
t solution (bromthymol blue) to the
ee Diagram 4-6.)

contents gently to mix. Cap the water

at the test solution will change
e to pale yellow or green) when there
dioxide present. Tell the students
der to see how the test solution
will use it on their own breath

flexible tubing to the straight
uns below the surface of the test
Instruct the students to blow
tly into the solution. In a few
solution should change from blue
indicating the presence of carbon
en off in human breath.

CATOR SOLUTION CHANGE COLOR?

ANTICIPATED STUDENT BEHAVIORS

Students should:

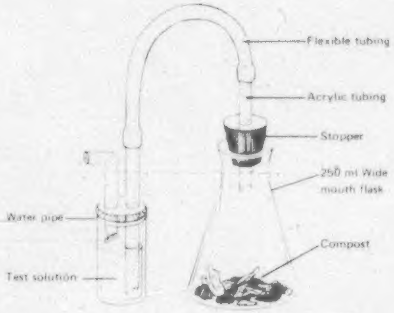
--respond, "Put a bunch in a jar and see if the blue goes away," "Put some solution on some rotting stuff."

--respond, "Yes, the blue disappears."

ACTIVITY
4-12

MATERIALS

Diagram 4-7



TEACHING STRATEGIES

DOES THE AIR WE BREATHE OUT HAVE MUCH CARBON DIOXIDE IN IT?

HOW DO YOU KNOW?

To demonstrate that little or no carbon dioxide is presen in the air we breathe in, connect a twelve-inch piece of flexible tubing to the short bent tube. Have the student draw the outside air through the solution by sucking on the tubing much as he would a straw. The solution should not change color.

After the experiment is completed continue by asking:

DID THE TEST SOLUTION CHANGE COLOR?

DOES THE AIR WE BREATHE IN HAVE MUCH CARBON DIOXIDE IN IT?

HOW DO YOU KNOW?

WE HAVE SEEN HOW THE CARBON DIOXIDE TEST SOLUTION WORKS. NOW LETS FIND OUT IF MICROBES BREATHE AND IF THEIR BREATH WILL MAKE THE TEST SOLUTION CHANGE COLOR.

Assign students to work in pairs and distribute flasks and tubing. Direct the students to assemble the equipment as follows. (See Diagram 4-7.)

1. Transfer about three heaping tablespoons of moist compost left from the planting exercise to a widemouthed flask. Be sure the compost is rich in organic matter.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
HE AIR WE BREATHE OUT HAVE MUCH CARBON E IN IT?	--infer that because of the color change it does, and respond, "Yes."
YOU KNOW?	--explain, "Color changes so there must be a lot of it."
ate that little or no carbon dioxide is present we breathe in, connect a twelve-inch piece of bing to the short bent tube. Have the student tside air through the solution by sucking on much as he would a straw. The solution should color.	
xperiment is completed continue by asking:	
E TEST SOLUTION CHANGE COLOR?	--respond, "No."
HE AIR WE BREATHE IN HAVE MUCH CARBON E IN IT?	--respond, "No."
YOU KNOW?	--recall the explanation and respond, "The blue color didn't change."
E SEEN HOW THE CARBON DIOXIDE TEST ON WORKS. NOW LETS FIND OUT IF ES BREATHE AND IF THEIR BREATH WILL HE TEST SOLUTION CHANGE COLOR.	
nts to work in pairs and distribute flasks Direct the students to assemble the equip- lows. (See Diagram 4-7.)	
fer about three heaping tablespoons of compost left from the planting exercise idemouthed flask. Be sure the compost h in organic matter.	

MATERIALS

TEACHING STRATEGIES

2. Insert the three-inch piece of acrylic tubing into the hole in the large rubber stopper. The tubing need only be inserted a short distance into the stopper.

3. Before placing the stopper in the flask, attach one end of the flexible tubing to the piece of tube in the stopper. Attach the other end to the straight tube of the water pipe that protrudes below the surface of the test solution.

4. Place the water pipe in something so it will stand up (beaker or baby food jar).

5. Put together, or have a student put together, an identical setup, but with no compost. This will serve as a control for the class experiments.

As each separate instruction is given, have each group complete the task before proceeding further. The entire experiment should run about twenty-four hours, although a weekend would be more satisfactory. The normal respiration due to the microbial decomposition of the organic compost should produce plenty of carbon dioxide. As the gas bubbles produced pass through the solution, it will turn from blue to pale yellow. The control, without compost, will not be undergoing decomposition and will, therefore, not cause a color change.

Part II.

At the beginning of the next class period, allow the students to observe the changes that have occurred.

Begin by having the students recall what they did the previous day.

Ask:

WHAT DID YOUR BREATH DO TO THE TEST SOLUTION?

TEACHING STRATEGIES

three-inch piece of acrylic tubing
ole in the large rubber stopper. The
d only be inserted a short distance
topper.

cing the stopper in the flask, attach
the flexible tubing to the piece of
e stopper. Attach the other end to
ht tube of the water pipe that protrudes
surface of the test solution.

water pipe in something so it will
beaker or baby food jar).

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to the microbial decomposition of the
should produce plenty of carbon dioxide.
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n blue to pale yellow. The control,
will not be undergoing decomposition
ore, not cause a color change.

of the next class period, allow the
ve the changes that have occurred.

he students recall what they did the

R BREATH DO TO THE TEST SOLUTION?

ANTICIPATED STUDENT BEHAVIORS

Students should:

--recall that it turned the solution yellow.

MATERIALS

TEACHING STRATEGIES

DID YOU NOTICE ANY CHANGE IN THE TEST SOLUTION IN THE FLASK WITH THE COMPOST?

WHAT DOES THE COLOR CHANGE TELL US ABOUT THE COMPOST?

IS COMPOST ALIVE?

ARE THERE ANY LIVING THINGS IN THE COMPOST?

WHAT DO THE MICROBES GIVE OFF WHILE THEY ARE LIVING IN THE COMPOST?

HOW DO YOU KNOW THAT THE MICROBES GIVE OFF CARBON DIOXIDE?

Now direct the students' attention to the control setup and say:

THIS IS THE CONTROL. WHAT IS DIFFERENT ABOUT THIS FLASK?

WAS THERE ANY CHANGE IN THE TEST SOLUTION OF THE EMPTY FLASK?

WHY DO YOU SUPPOSE THERE WAS NO CHANGE?

DO YOU THINK THE MICROBES IN THE COMPOST ARE ALIVE?

WHY?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
NOTICE ANY CHANGE IN THE TEST SOLUTION FLASK WITH THE COMPOST?	--respond, "It turned yellow," "Blue color is gone," "Carbon dioxide was in the flask."
ES THE COLOR CHANGE TELL US ABOUT THE ?	--respond, "The bubbles are carbon dioxide," "Microbes must breathe, too."
OST ALIVE?	--respond, "No."
RE ANY LIVING THINGS IN THE COMPOST?	--recall that microbes are in compost.
THE MICROBES GIVE OFF WHILE THEY ARE IN THE COMPOST?	--respond, "The microbes give off carbon dioxide," "They breathe carbon dioxide."
YOU KNOW THAT THE MICROBES GIVE OFF DIOXIDE?	--indicate that the test solution changed color.
he students' attention to the control setup	
THE CONTROL. WHAT IS DIFFERENT ABOUT ASK?	--respond, "No compost in it," "One is empty."
RE ANY CHANGE IN THE TEST SOLUTION OF TY FLASK?	--respond, "No."
YOU SUPPOSE THERE WAS NO CHANGE?	--respond, "No microbes in the empty jar," "No microbes were breathing."
THINK THE MICROBES IN THE COMPOST ARE	--respond, "Yes."
	--respond, "Made the color change," "They breathe."

MATERIALS

TEACHING STRATEGIES

WHAT ARE THE THINGS WE HAVE LEARNED THAT MICROBES DO THAT MIGHT MAKE YOU THINK THEY ARE ALIVE?

CHANGE OF

See Change of Pacer 14.

TEACHING STRATEGIES

THINGS WE HAVE LEARNED THAT
THAT MIGHT MAKE YOU THINK THEY

er 14.

CHANGE OF PACER

ANTICIPATED STUDENT BEHAVIORS

Students should:

--respond, "They die if they have nothing to eat," "They make carbon dioxide in compost," "They breathe," "They eat."

Upon completion of this activity, each student should, as a minimum:

- --*change carbon dioxide test solution from blue to yellow by blowing bubbles into it*
- --*participate in carrying out the compost experiment*
- --*describe orally the changes that took place in test solutions when used with the compost and with the control.*

ACTIVITY 4-12

Activity name suggested by class:

Teacher____________________

BSCS USE: Post___ Tally___ Rev___

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s)____________ Comment:

Specific Questions:

12. Did the compost change the color of test solution? ☐ No ☐ Yes: The color changed from _________ to _________ Comment:

13. Did students associate the presence of carbon dioxide with living microbes?
☐ No ☐ Yes How many? Comment:

BSCS Evaluation:

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is
☐ Of value--needs the revision suggested
☐ Worth salvaging--make major changes described
☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s)______________ Comment:

Specific Questions:

12. Did the compost change the color of test solution? ☐ No ☐ Yes: The color changed from _________ to ___________ Comment:

13. Did students associate the presence of carbon dioxide with living microbes?
☐ No ☐ Yes How many?_____________ Comment:

BSCS Evaluation: EMH Feedback Form 1d

Side A

Teacher ______________________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

BSCS Evaluation:

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff (we will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

BSCS Evaluation: EMH Feedback Form 1d

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

2. Develop an understanding of cycling and appreciate the cycling relationship of the materials and organisms in the environment.

3. Recognize the role of decomposers in the cycling process.

Core B Objectives for the Student:

1. Recognize the role microbes play in the decomposition process.

2. Discover environmental requirements of microbes and other decomposers.

ENVIRONMENTAL THEME:

Interrelationship of Environmental Components, Complementarity of Organisms and Environment, Cyclic Nature of Processes

INQUIRY SKILLS:

Observing, Associating, Describing, Comparing

PROBLEM-SOLVING SKILLS:

Experimenting, Identifying Variables, Identifying Controls, Interpreting Results

PRACTICAL APPLICATION:

Working in a Group, Learning Food Storage Procedures

CTIVITY

oals for the Student:

2. Develop an understanding of cycling and appreciate the cycling relationship of the materials and organisms in the environment.

. Recognize the role of decomposers in the cycling process.

Objectives for the Student:

. Recognize the role microbes play in the decomposition process.

. Discover environmental requirements of microbes and other decomposers.

AL THEME:

elationship of Environmental Components,
mentarity of Organisms and Environment,
Nature of Processes

LLS:

ing, Associating, Describing, Comparing

VING SKILLS:

menting, Identifying Variables,
fying Controls, Interpreting Results

PPLICATION:

g in a Group, Learning Food Storage
ures

BSCS

UNIT IV.	TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT
CORE B.	DECOMPOSERS IN MY ENVIRONMENT
ACTIVITY 4-13.	WET AND DRY

ACTIVITY
4-13

MATERIALS

2 Plastic petri dishes with covers per student, 9 cm
2 Filter paper discs per student, 7 cm (paper toweling may be used as a substitute)
1 Medicine dropper per student
Worksheet 4-4
Slide 4-22
*Assorted dry foods such as:
    Corn flakes
    Egg noodles
    Oat flakes
    Flour
    Cornmeal
    Tea
    Hay
    Beans, dried for cooking
    Peas, dried for cooking
*Cardboard carton, file drawer, or other dark storage place
*35 mm Slide projector
*Masking tape

*Not furnished in materials kit

TEACHING STRATEGIES

Activity 4-13. Wet and Dry

This activity will demonstrate that moisture is an essential component of a good environment for decomposers.

Teacher Preparation:

Put the assorted dry materials into beakers. Label each beaker.

If the class has completed Activity 4-9 and observed the pill bugs, begin by asking:

> WHAT DID WE PUT INTO THE PILL BUG BOX?
>
> WHY DO YOU SUPPOSE WE PUT IN THE LEAVES?
>
> WHY DID WE PUT IN THE WET SPONGE?

If the pill bug activity (4-9) has not been done, reference should be made to the compost pile in Activity 4-0.

Point to the class compost pile and say:

> WOULD OUR COMPOST DECOMPOSE IF THE PILE WERE COMPLETELY DRY?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
13. Wet and Dry	*During this activity, each student should:*
ty will demonstrate that moisture is an *omponent of a good environment for decomposers.*	*--prepare a petri dish with filter paper inside* *--select a sample material for testing* *--use a medicine dropper to moisten filter paper* *--compare microbe growth in moist and dry dishes* *--infer that microbes require some special conditions for growth* *--infer that the absence of a required condition may prevent growth of some microbes* *--associate certain food packaging with prevention of spoilage.*
paration:	Students should:
orted dry materials into beakers. Label each	
s has completed Activity 4-9 and observed the begin by asking:	
ID WE PUT INTO THE PILL BUG BOX?	--respond, "Soil," "Leaves," "Wet sponge," "Pill bugs."
YOU SUPPOSE WE PUT IN THE LEAVES?	--respond, "For food," "For bugs to eat."
WE PUT IN THE WET SPONGE?	--respond, "For water," "So the bugs wouldn't die."
bug activity (4-9) has not been done, refer- be made to the compost pile in Activity 4-0.	
class compost pile and say:	
UR COMPOST DECOMPOSE IF THE PILE WERE ELY DRY?	--guess, "Yes," "No," "Don't know."

MATERIALS

TEACHING STRATEGIES

DO YOU THINK THAT THE MICROBES IN THE COMPOST PILE NEED MOISTURE?

Discuss the idea that, in addition to a place to live (shelter), most organisms require food and moisture. Ask:

DO WE NEED WATER TO STAY ALIVE?

Display the labeled beakers containing the assorted dry materials you have selected and ask:

WHAT ARE THESE THINGS?

ARE THEY WET OR DRY?

WHAT WOULD HAPPEN TO THESE DRY THINGS IF THEY GOT WET?

DOES IT MATTER IF DRY FOODS GET WET?

ACCEPT
ANSWE

TODAY WE ARE GOING TO FIND OUT IF IT MAKES ANY DIFFERENCE IF THINGS ARE WET OR DRY.

Allow each student to select a small amount (about seven or eight particles) of one food material to be tested. Write on the chalkboard what each student selects. Accept duplications as long as a wide variety of materials is tested by the class.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
THAT THE MICROBES IN THE COMPOST ISTURE?	--respond, "Yes," "Maybe," "Don't know."
that, in addition to a place to live rganisms require food and moisture.	
ATER TO STAY ALIVE?	--respond, "Yes."
ed beakers containing the assorted dry e selected and ask:	
SE THINGS?	--respond, "Food," "Things we eat."
OR DRY?	--respond, "Dry."
APPEN TO THESE DRY THINGS IF ?	--make various guesses such as, "Spoil," "Get soggy," "Be messy."
ER IF DRY FOODS GET WET?	--relay experiences and guesses.

ACCEPT ALL ANSWERS

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
GOING TO FIND OUT IF IT MAKES CE IF THINGS ARE WET OR DRY.	
t to select a small amount (about seven s) of one food material to be tested. kboard what each student selects. ns as long as a wide variety of materials class.	--choose a food to be tested.

ACTIVITY
4-13

MATERIALS

Slide 4-22

TEACHING STRATEGIES

SELEC

Now project Slide 4-22 (Worksheet 4-4) and indicate to the students where to write the name of the material they are testing.

Say:

> WHAT DO WE CALL THE THINGS YOU HAVE SELECTED?
>
> WOULD YOU DESCRIBE THEM AS WET OR DRY?

Distribute the following testing materials to each student:

Two plastic petri dishes with covers
Two filter paper discs
One medicine dropper

Have the students test their materials as follows:

1. Place a filter paper disc or circular piece of paper toweling in the bottom of each petri dish.
2. Place a sample of the dry food material to be tested (three or four cereal flakes, three or four beans, one-eighth teaspoon tea, etc.) in each dish.
3. Moisten the filter paper in one of the dishes with a full medicine dropper of water. The paper in the matching dish should remain dry.
4. Replace the covers on all dishes.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
SELECTION TIME	
Slide 4-22 (Worksheet 4-4) and indicate to s where to write the name of the material sting.	
D WE CALL THE THINGS YOU HAVE SELECTED?	--respond "Food."
YOU DESCRIBE THEM AS WET OR DRY?	--respond, "Dry."
the following testing materials to each astic petri dishes with covers lter paper discs dicine dropper	
dents test their materials as follows:	
a filter paper disc or circular piece of toweling in the bottom of each petri dish.	
a sample of the dry food material to be d (three or four cereal flakes, three or beans, one-eighth teaspoon tea, etc.) in dish.	
en the filter paper in one of the dishes with medicine dropper of water. The paper in the ng dish should remain dry.	
e the covers on all dishes.	

5. Using masking tape, label wet or dry, the name of the material, the student's initials and date. Attach appropriate label to petri dishes.

WOR
TIM

Then ask:

WHY DID WE SET UP TWO DISHES FOR EACH MATERIAL?

To reinforce the idea of a control, ask:

WHAT ARE WE TRYING TO FIND OUT ABOUT THESE DRY FOOD MATERIALS?

HOW WILL WE KNOW IF THE FOOD CHANGES WHEN WATER IS ADDED TO IT?

HOW WILL WE KNOW IF THE WET FOOD LOOKS DIFFERENT THAN DRY FOOD?

The assembled dishes should be placed in a dark, dry place. Each day until fungus appears allow time for students to retrieve their dishes and worksheets, note any changes that have occurred, and record the appearance of the food on their worksheets. The experiment may be terminated as soon as fungus growth is well developed by using the discussion strategy on the following page. While the experiment continues, you may proceed with the next activity, returning to the worksheets each day to record observations.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
ing tape, label wet or dry, the name erial, the student's initials and ach appropriate label to petri dishes.	--set up experimental petri dishes.
SET UP TWO DISHES FOR EACH MATERIAL?	--respond, "To see what will happen to the food left dry and with water added.
idea of a control, ask:	
TRYING TO FIND OUT ABOUT THESE DRY ALS?	--respond, "See what happens when dry foods get wet," "To see if they rot."
KNOW IF THE FOOD CHANGES WHEN WATER IT?	--predict, "It will look different," "It will rot," "It will stink."
KNOW IF THE WET FOOD LOOKS DIFFERENT OD?	--respond, "Compare it to the dry," "Look at the two dishes."
shes should be placed in a dark, dry until fungus appears allow time for ieve their dishes and worksheets, note have occurred, and record the appearance heir worksheets. The experiment may be on as fungus growth is well developed by sion strategy on the following page. ment continues, you may proceed with the eturning to the worksheets each day to ons.	

TEACHING STRATEGIES

ing tape, label wet or dry, the name
erial, the student's initials and
ach appropriate label to petri dishes.

SET UP TWO DISHES FOR EACH MATERIAL?

idea of a control, ask:

TRYING TO FIND OUT ABOUT THESE DRY
ALS?

KNOW IF THE FOOD CHANGES WHEN WATER
IT?

KNOW IF THE WET FOOD LOOKS DIFFERENT
OD?

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until fungus appears allow time for
ieve their dishes and worksheets, note
have occurred, and record the appearance
heir worksheets. The experiment may be
on as fungus growth is well developed by
sion strategy on the following page.
ment continues, you may proceed with the
eturning to the worksheets each day to
ons.

ANTICIPATED STUDENT BEHAVIORS

Students should:

--set up experimental petri dishes.

--respond, "To see what will happen to the food left dry and with water added.

--respond, "See what happens when dry foods get wet," "To see if they rot."

--predict, "It will look different," "It will rot," "It will stink."

--respond, "Compare it to the dry," "Look at the two dishes."

MATERIALS

TEACHING STRATEGIES

As observations are made, help the students to realize how valuable the dry dish is for comparison with the wet dish. Also help them verbalize and write the differences on their worksheets. Direct students to read what they have recorded.

After the experiment has continued long enough for all students to have noticed and recorded changes in the wet food, use the following strategy for discussion.

Ask:

> LOOK AT YOUR WORKSHEETS. ON THE (date) WHAT HAPPENED TO OUR DRIED FOOD WHEN WE MADE IT WET?

Using different days, encourage students to read from their worksheets. You may wish to compare the number of days it took different foods to mold and the appearance of different things. Allow time for students to view each other's dishes.

Ask:

> WHEN DID (item) START TO DECOMPOSE?
>
> WHAT CAUSED THE FOOD TO GET MOLDY AND DECOMPOSE?
>
> > If students do not answer this, ask:
> >
> > WHY DIDN'T THE DRY FOOD GET MOLDY AND DECOMPOSE?
> >
> > Remind students that the only difference between the dishes was that one had water and the other didn't and, therefore, wetness is a condition necessary for the mold to grow.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
tions are made, help the students to realize le the dry dish is for comparison with the Also help them verbalize and write the s on their worksheets. Direct students to they have recorded.	
experiment has continued long enough for all o have noticed and recorded changes in the use the following strategy for discussion.	
AT YOUR WORKSHEETS. ON THE (date) WHAT NED TO OUR DRIED FOOD WHEN WE MADE IT WET?	--examine their results on specific dates, and state, "They molded," "They got gushy," "They got soggy."
erent days, encourage students to read from sheets. You may wish to compare the number took different foods to mold and the appear- fferent things. Allow time for students to other's dishes.	
DID (item) START TO DECOMPOSE?	--respond, "The second day," "The third day," "The fifth day."
CAUSED THE FOOD TO GET MOLDY AND DECOMPOSE?	--respond, "The water."
If students do not answer this, ask:	
WHY DIDN'T THE DRY FOOD GET MOLDY AND DECOMPOSE?	--respond, "No water," "Not wet."
Remind students that the only difference between the dishes was that one had water and the other didn't and, therefore, wetness is a condition necessary for the mold to grow.	

MATERIALS

TEACHING STRATEGIES

WHAT DO YOU SUPPOSE NEEDS THE WATER?

WHAT ELSE DID WE LOOK AT RECENTLY THAT NEEDED WATER?

DO DEAD THINGS NEED WATER?

ARE MOLDS ALIVE?

Review briefly the kinds of foods that have been tested.

Then ask:

HOW ARE THESE FOODS USUALLY STORED AT HOME OR AT THE GROCERY STORE?

WHAT KIND OF PACKAGES DO THEY USUALLY COME IN?

WHAT DOES WATER DO TO FOODS THAT ARE NORMALLY DRY?

Collect Worksheet 4-4. After class, turn to the Development of Experience in Observation page of the Student Record of Progress and use the worksheets to rate each student's success in making appropriate observations and recording them. Then send the worksheets and a copy of your ratings to BSCS.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
SUPPOSE NEEDS THE WATER?	--respond, "The molds," "The microbes," "The decomposers."
ID WE LOOK AT RECENTLY THAT NEEDED	--recall, "Pill bugs," "Compost."
NGS NEED WATER?	--probably say, "No."
LIVE?	--probably say, "Yes," or be perplexed.
he kinds of foods that have been tested.	
SE FOODS USUALLY STORED AT HOME OR ERY STORE?	--respond, "In dry places."
F PACKAGES DO THEY USUALLY COME IN?	--respond with appropriate answers that relate to dryness and air tightness.
ATER DO TO FOODS THAT ARE NORMALLY	--respond, "Makes it moldy," "Spoils it."
t 4-4. After class, turn to the xperience in Observation page of the f Progress and use the worksheets to rate uccess in making appropriate observations em. Then send the worksheets and a copy to BSCS.	

Upon completion of this activity, each student should, as a minimum:

- *--have added food materials to petri dishes under wet and dry conditions*
- *--have observed the wet and dry foods for several days*
- *--have recorded observations on Worksheet 4-4.*

ACTIVITY 4-13

Activity name suggested by class:

Teacher ____________________

BSCS USE: Post___ Tally___ Rev___

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest. Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is
☐ Of value--needs the revision suggested
☐ Worth salvaging--make major changes described
☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s)______________ Comment:

Specific Questions:

12. Did students have difficulty recording observations on Worksheet 4-4?
☐ No ☐ Yes Comment:

13. Did students understand the idea of control? ☐ No ☐ Yes How many?________
How did they express the idea?

BSCS Evaluation: E

☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

11. Your rating of this activity:

☐ Worthwhile --keep as is	☐ Of value--needs the revision suggested	☐ Worth salvaging--make major changes described	☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s)______________ Comment:

Specific Questions:

12. Did students have difficulty recording observations on Worksheet 4-4?
☐ No ☐ Yes Comment:

13. Did students understand the idea of control? ☐ No ☐ Yes How many?________
How did they express the idea?

14. Did students associate the mold with moisture? ☐ Yes ☐ No Comment:

BSCS Evaluation: EMH Feedback Form 1d

Side A

Teacher ______________________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

BSCS Evaluation: E

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff (we will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

2. Develop an understanding of cycling and appreciate the cycling relationship of the materials and organisms in the environment.

3. Recognize the role of decomposers in the cycling process.

Core B Objectives for the Student:

1. Recognize the role microbes play in the decomposition process.

2. Discover environmental requirements of microbes and other decomposers.

ENVIRONMENTAL THEME:

Interrelationships of Environmental Components, Complementarity of Organisms and Environment

INQUIRY SKILLS:

Observing, Associating, Describing, Comparing

PROBLEM-SOLVING SKILLS:

Experimenting, Identifying Variables, Identifying Controls, Interpreting Results

PRACTICAL APPLICATION:

Learn Proper Food Storage Procedures

CTIVITY

cals for the Student:

. Develop an understanding of cycling and appreciate the cycling relationship of the materials and organisms in the environment.

. Recognize the role of decomposers in the cycling process.

Objectives for the Student:

. Recognize the role microbes play in the decomposition process.

. Discover environmental requirements of microbes and other decomposers.

AL THEME:
elationships of Environmental Components,
mentarity of Organisms and Environment

LLS:
ing, Associating, Describing, Comparing

VING SKILLS:
menting, Identifying Variables,
fying Controls, Interpreting Results

PPLICATION:
Proper Food Storage Procedures

BSCS

UNIT IV. TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT

CORE B. DECOMPOSERS IN MY ENVIRONMENT

ACTIVITY 4-14. COOL AND WARM

ACTIVITY
4-14

MATERIALS

Slide 4-23
Worksheet 4-5
*Ice chest or refrigerator
*2 Baby food jars or milk cartons per student
*Plastic kitchen wrap
*Food samples usually refrigerated
*Masking tape for labeling
*35 mm Slide projector

*Not furnished in materials kit

TEACHING STRATEGIES

Activity 4-14. Cool and Warm

In this activity students will again associate microbes with the spoilage of food. The concept of refrigerating certain foods to prevent their spoilage will become apparent. Results will vary depending on what foods the students bring in. Capitalize on the variety of results to illustrate that refrigeration is more critical with some foods than with others.

Teacher Preparation:

Bring to class several samples of foods that normally require refrigeration such as milk, fresh meats, cottage cheese, and so forth. You may wish to have the students bring samples from home. Bring enough yourself so there are sure to be sufficient foods on hand to perform the activity.

Begin by asking:

IN WHAT KINDS OF PLACES DO MICROBES GROW BEST?

HOW CAN WE STORE FOODS TO KEEP THEM FROM DECOMPOSING?

> If the students do not recall this, ask:
>
> WHAT DID WE LEARN ABOUT STORING FOODS IN OUR LAST ACTIVITY?

Continue by asking:

CAN ALL FOODS BE STORED DRY?

WHICH ONES CANNOT BE STORED DRY?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
14. Cool and Warm *ivity students will again associate microbes* *oilage of food. The concept of refrigerating* *ds to prevent their spoilage will become* *Results will vary depending on what foods the* *ing in. Capitalize on the variety of results* *te that refrigeration is more critical with* *than with others.*	*During this activity, each student should:* *--state reasons for refrigerating certain foods* *--divide selected food samples in half, placing both portions in properly labeled containers* *--place one portion of each sample in a refrigerator the other in the classroom* *--observe both samples for a week and record daily observations on Worksheet 4-5* *--infer that spoilage is decomposition and is caused by microbes* *--conclude that refrigeration reduces decomposition and spoilage of some foods.*
paration: ass several samples of foods that normally rigeration such as milk, fresh meats, cottage so forth. You may wish to have the students es from home. Bring enough yourself so there be sufficient foods on hand to perform the	Students should:
king:	
T KINDS OF PLACES DO MICROBES GROW BEST?	--recall that microbes grow in wet places.
N WE STORE FOODS TO KEEP THEM FROM OSING?	--recall that keeping foods dry is a proper storage method.
the students do not recall this, ask:	
HAT DID WE LEARN ABOUT STORING FOODS IN JR LAST ACTIVITY?	--respond, "Keep them dry."
asking:	
FOODS BE STORED DRY?	--respond, "No."
NES CANNOT BE STORED DRY?	--respond, "Milk," "Coke," "Catsup," and so forth.

MATERIALS

TEACHING STRATEGIES

Hold up the food samples one at a time and ask:

WHAT IS THIS FOOD?

WHERE IS (item) USUALLY STORED?

WHY?

After students have identified the foods, ask:

WHAT WOULD HAPPEN IF YOU DID NOT KEEP THESE FOODS IN THE REFRIGERATOR?

LET'S SEE WHAT HAPPENS IF WE LEAVE PART OF THESE FOODS OUT OF THE REFRIGERATOR.

Allow each student to select a food to test. Have students divide their food in half in whatever way is appropriate for the food they have chosen.

Put each half into a jar or milk carton and label with the student's name and either "cold" or "warm." Have the students cover the containers with plastic kitchen wrap and place one container in the refrigerator or cooler and the other in the classroom in a warm, dark place.

Do not keep this experiment in the same place as the "wet-dry" foods. Separate and label these experiments physically in the room so students do not get them confused.

Have the students observe both containers each day for the next week.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
samples one at a time and ask:	
S FOOD?	--identify the food.
tem) USUALLY STORED?	--respond, "In the refrigerator."
	--state reasons for keeping them refrigerated: "Keeps it cold," "Keeps it from rotting," "Don't know."
ave identified the foods, ask:	
HAPPEN IF YOU DID NOT KEEP THESE E REFRIGERATOR?	--respond, "I don't know," "Melt," "Rot," "Get smelly."
HAT HAPPENS IF WE LEAVE PART OF OUT OF THE REFRIGERATOR.	
nt to select a food to test. Have their food in half in whatever way is the food they have chosen.	
to a jar or milk carton and label with me and either "cold" or "warm." Have er the containers with plastic kitchen ne container in the refrigerator or ther in the classroom in a warm, dark	
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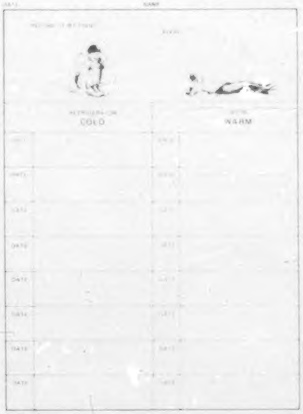
s observe both containers each day for	

ACTIVITY
4-14

MATERIALS

Slide 4-23, Worksheet 4-5



TEACHING STRATEGIES

Have the students record their observations each day on Worksheet 4-5. Project Slide 4-23 and point to the cold and warm columns. So that the students will know how to record on the worksheet properly, select a student to come to the front and write his observations in the appropriate space on the projected slide. Encourage students to keep good records of the kinds of changes mentioned above. Assist them in their verbalization and writing of the results on their worksheets.

If your students have difficulty writing their observations, ask them to describe what they see while you write the appropriate descriptive terms on the chalkboard. Students can then copy the words on their worksheets.

Many interesting changes should take place, including the growth of beautiful molds. In addition, smells will develop that are not so beautiful. Changes in texture and color will accompany the other changes. The foods at room temperature should spoil, mold, and change much more quickly than the refrigerated ones. Draw attention to these changes by asking questions such as:

HOW ARE THE FOODS IN THE TWO DISHES DIFFERENT?

WHY?

RECOR
2-

When the results are obviously different (in about two to five days), ask:

TEACHING STRATEGIES

dents record their observations each day on
5. Project Slide 4-23 and point to the cold
umns. So that the students will know how to
e worksheet properly, select a student to
front and write his observations in the
space on the projected slide. Encourage
keep good records of the kinds of changes
ove. Assist them in their verbalization and
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beautiful molds. In addition, smells will
are not so beautiful. Changes in texture
l accompany the other changes. The foods
rature should spoil, mold, and change much
than the refrigerated ones. Draw attention
ges by asking questions such as:

THE FOODS IN THE TWO DISHES DIFFERENT?

ANTICIPATED STUDENT BEHAVIORS

Students should:

--describe the appearance of the food in the two dishes: "They have white stuff on them," "They look fuzzy," "One's a different color."

--speculate about why the foods are different.

RECORD RESULTS
2-5 DAYS

lts are obviously different (in about two
, ask:

MATERIALS	TEACHING STRATEGIES
	(Student's name), WHAT FOOD HAVE YOU BEEN OBSERVING? WHAT DIFFERENCES HAVE YOU NOTICED BETWEEN THE TWO SAMPLES? If the student has difficulty describing the differences, help him to refer to the worksheet and the daily changes he has written. After several students have had an opportunity to describe their foods, ask: WHAT HAPPENS TO MOST FOODS IF WE TAKE THEM OUT OF THE REFRIGERATOR AND LEAVE THEM OUT? WHAT CAUSES THEM TO SPOIL? SHOULD WE EAT SPOILED FOOD? WHY NOT? WHY SHOULD WE KEEP FOODS IN THE REFRIGERATOR? WHY DO YOU THINK THAT REFRIGERATION KEEPS FOOD FROM SPOILING? Conclude by asking: LET'S SEE HOW MANY FOODS WE CAN LIST THAT SHOULD BE KEPT IN THE REFRIGERATOR.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
name), WHAT FOOD HAVE YOU BEEN	--name the food.
ENCES HAVE YOU NOTICED BETWEEN THE ?	--describe changes that have occurred over the past several days.
as difficulty describing the differences, r to the worksheet and the daily changes	
udents have had an opportunity to describe :	
S TO MOST FOODS IF WE TAKE THEM OUT IGERATOR AND LEAVE THEM OUT?	--compare the results of individual student observations and generalize by saying, "Many foods spoil, rot," "Get to smelling bad."
THEM TO SPOIL?	--respond, "Microbes," "Decomposers," "Molds."
AT SPOILED FOOD?	--respond, "No."
	--respond, "It would make you sick," "It smells," "It tastes icky."
WE KEEP FOODS IN THE REFRIGERATOR?	--infer that refrigeration reduces spoilage and danger of illness. "So they won't spoil," "So they stay cold."
THINK THAT REFRIGERATION KEEPS FOOD NG?	--infer that it is too cold for microbes to grow.
ng:	
OW MANY FOODS WE CAN LIST THAT EPT IN THE REFRIGERATOR.	--respond with many foods.

MATERIALS

TEACHING STRATEGIES

When in doubt about a particular food, advise students that it usually will not hurt to put the food in the refrigerator so put it in.

Collect Worksheet 4-5. After class, turn to the Development of Experience in Observation page of the Student Record of Progress. Use the worksheets to rate each student's success in making appropriate observations and recording them. Based on your ratings in Activities 4-10, 4-13, and 4-14 decide who needs help most and who can serve to assist other students. Plan to provide special help when observation is next required. Send the worksheets and a copy of your ratings to BSCS.

CHANG

See Change of Pacer 15.

TEACHING STRATEGIES

bt about a particular food, advise students
ally will not hurt to put the food in the
r so put it in.

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t's success in making appropriate observations
ng them. Based on your ratings in Activities
and 4-14 decide who needs help most and who
o assist other students. Plan to provide
p when observation is next required. Send
ets and a copy of your ratings to BSCS.

CHANGE OF PACER

of Pacer 15.

ANTICIPATED STUDENT BEHAVIORS

Upon completion of this activity, each student should, as a minimum:

--select food samples for cool and warm experiment
--observe both food samples for a week
--record observations on Worksheet 4-5.

ACTIVITY 4-14

Activity name suggested by class:

Teacher____________________

BSCS USE: Post___ Tally___ Rev___

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent ~~on each~~ date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s)______________ Comment:

Specific Questions:

12. Did students have difficulty recording observations on Worksheet 4-5?
☐ No ☐ Yes Comment:

13. Did students associate spoilage with microbial growth? ☐ No ☐ Yes How many?_____
What did they say to indicate this?

BSCS Evaluation:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

11. Your rating of this activity:

☐ Worthwhile --keep as is
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If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s)______________ Comment:

Specific Questions:

12. Did students have difficulty recording observations on Worksheet 4-5?
☐ No ☐ Yes Comment:

13. Did students associate spoilage with microbial growth? ☐ No ☐ Yes How many?_____
What did they say to indicate this?

BSCS Evaluation: EMH Feedback Form 1d

Teacher ______________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff (we will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

Me and my Environment

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

3. Recognize the role of decomposers in the cycling process.

Core B Objectives for the Student:

1. Recognize the role microbes play in the decomposition process.

2. Discover environmental requirements of microbes and other decomposers.

3. Appreciate how knowledge of decomposers can improve man's environment.

ENVIRONMENTAL THEME:

Interrelationships of Environmental Components, Complementarity of Organisms and Environment

INQUIRY SKILLS:

Observing

PROBLEM-SOLVING SKILLS:

Asking Questions, Drawing Conclusions

PRACTICAL APPLICATION:

Learn Proper Storage Practices, Identify Vocational Opportunities in Food Related Industries, Practice Using Food Lists When Grocery Shopping

CTIVITY

oals for the Student:
. Recognize the role of decomposers in the cycling process.

Objectives for the Student:
. Recognize the role microbes play in the decomposition process.

. Discover environmental requirements of microbes and other decomposers.

. Appreciate how knowledge of decomposers can improve man's environment.

AL THEME:
elationships of Environmental Components,
mentarity of Organisms and Environment

LLS:
ing

VING SKILLS:
Questions, Drawing Conclusions

PPLICATION:
Proper Storage Practices, Identify
onal Opportunities in Food Related
ries, Practice Using Food Lists When
y Shopping

BSCS

UNIT IV.	TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT
CORE B.	DECOMPOSERS IN MY ENVIRONMENT
ACTIVITY 4-15.	STOR(ING) PROBLEMS

ACTIVITY
4-15

MATERIALS

*Cassette tape recorder (optional)
*Blank cassette(s) (optional)

*Not furnished in materials kit

TEACHING STRATEGIES

Activity 4-15. Stor(ing) Problems

In this activity students will visit a supermarket to fin out how the grocer deals with the problem of food spoilage. Students will learn how supermarkets preserve food. They will also become aware of some of the special problems involved in preserving very perishable products such as meats, fresh fruits, vegetables, and bakery and dairy products. The various ways the foods are displayed and stored on the shelves and in the stockroom will be observed. Interviews with various people in the store such as the general manager, the butcher, the bakery manager, and the produce manager should further establish the store's problems.

Teacher Preparation:

1. Be sure to contact the supermarket manager well in advance (at least one week) of the date you hope to visit the store. Select with him a mutually acceptable date and time for the trip. Also decide in advance which departments you would like to visit and arrange for general remarks from the manager, butcher, bakery manager, produce manager, etc. It is also advisable to call the day before the scheduled trip to verify that all systems are still "go" for the visit.

2. If you decide to use the tape recorder in the store, ask the manager if this is okay.

3. If it is not feasible to take your class from the school to visit a store, a visit to the school cafeteria would be an acceptable substitute.

The day before the visit ask:

WHERE IS A LOT OF FOOD STORED?

HOW DO THEY STORE ALL THAT FOOD?

TEACHING STRATEGIES

. Stor(ing) Problems

ity students will visit a supermarket to find
rocer deals with the problem of food
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the visit ask:

A LOT OF FOOD STORED?

EY STORE ALL THAT FOOD?

ANTICIPATED STUDENT BEHAVIORS

During this activity, each student should:

- *participate in the discussion to formulate questions prior to the store trip*
- *visit the supermar[illegible]*
- *observe various ways food storage is handled in a store*
- *interview various people in the supermarket*
- *participate in post-visit discussion.*

Students should:

--respond, "Stores," "Eating places."

--give a variety of responses, "Refrigerators," "Cans," "Boxes."

MATERIALS

TEACHING STRATEGIES

WE ARE GOING TO VISIT A SUPERMARKET TOMORROW TO SEE HOW FOOD IS STORED. WHAT ARE SOME OF THE DIFFERENT PARTS OF THE STORE WE MIGHT VISIT?

ACCEPT
ANSWE

BEFORE WE GO, WE SHOULD HAVE SOME QUESTIONS IN MIND TO ASK PEOPLE WORKING THERE. WHAT ARE SOME OF THE THINGS WE COULD ASK ABOUT HOW THEY HANDLE FOOD?

QUESTION

ACCEPT
ANSWE

ACTIVITY
4-15

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
G TO VISIT A SUPERMARKET TOMORROW FOOD IS STORED. WHAT ARE SOME OF THE ARTS OF THE STORE WE MIGHT VISIT?	Students should: --respond, "Meat section," "Bakery," "Canned foods," "Vegetables and fruits."

ACCEPT ALL ANSWERS

D, WE SHOULD HAVE SOME QUESTIONS IN PEOPLE WORKING THERE. WHAT ARE THINGS WE COULD ASK ABOUT HOW THEY ?	--respond with questions that could be asked about storing foods.

QUESTION TIME

ACCEPT ALL ANSWERS

ACTIVITY
4-15

MATERIALS

TEACHING STRATEGIES

As students suggest questions, write them on the chalkboard. Pursue this until questions of the following nature have been brought out:

1. What kinds of foods can you store the longest?
2. What kinds of foods spoil the fastest?
3. What are some of the things you do to keep foods from spoiling?
4. Is it against the law to sell food that has been stored a long time?
5. Do foods that spoil easily cost more because they spoil easily?
6. What do you do with spoiled food?
7. How much food has to be disposed of because it has spoiled?
8. Where and how do you store meats?
9. Where and how do you store bakery products?
10. Where and how do you store fresh fruits and vegetables?
11. Where and how do you store dairy products?
12. Does a dented can cause food to spoil?
13. What foods have dates stamped on the package? Why is this done?

Divide up the questions evenly between pairs of students and make them responsible for finding the answers. The teacher should have the list of questions with her to help restore memories, if necessary! A tape recorder may be taken on the trip to help record answers to the questions.

When you arrive at the store, tour as a group. Stop at many places and discuss the storage methods that are shown. Start with easy ones that students have had experience with in class, i.e., cold, hot, dry, and so forth. Then proceed to more subtle ones of wrapping, bottling, and canning. Do not lecture! Ask students to tell you what they see and why. It might be difficult for students to distinguish between meaningful packaging and gimmicks to sell. Help them.

TEACHING STRATEGIES

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ue this until questions of the following
been brought out:

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to distinguish between meaningful packaging
to sell. Help them.

ANTICIPATED STUDENT BEHAVIORS

MATERIALS

TEACHING STRATEGIES

After the group tour, talk to various people in the store that you have arranged to meet with. Then before leaving the store, give students some free time to roam and find other examples on their own, but keep students together as a group.

The day after the visit, discuss all the questions and answers students gathered at the store. Then ask:

WHY CAN SOME FOODS BE KEPT IN THE SUPERMARKET LONGER THAN OTHERS?

WHAT IS IT THAT DECOMPOSES THE FOOD?

HOW WERE THINGS STORED AT THE SUPERMARKET?

ACCEPT A
ANSWER

SHOULD YOU STORE THINGS AT HOME THE WAY THEY ARE STORED IN THE SUPERMARKET?

WHY?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
tour, talk to various people in the store ranged to meet with. Then before leaving students some free time to roam and find n their own, but keep students together	Students should:
e visit, discuss all the questions and gathered at the store. Then ask:	
E FOODS BE KEPT IN THE SUPERMARKET OTHERS?	--respond, "Some rot faster."
THAT DECOMPOSES THE FOOD?	--respond, "Microbes," "Molds."
INGS STORED AT THE SUPERMARKET?	--respond, "Frozen," "Packaged," "Dried," "Precooked."
ACCEPT ALL ANSWERS	
STORE THINGS AT HOME THE WAY THEY IN THE SUPERMARKET?	--respond, "Yes."
	--respond, "So they won't rot, decompose," "So they keep longer."

Upon completion of this activity, each student should, as a minimum:

- *--have visited a supermarket (or school cafeteria)*
- *--have observed various ways food storage is handled in a supermarket*
- *--have participated in post-visit discussion.*

ACTIVITY
4-15

MATERIALS

TEACHING STRATEGIES

CHANG

See Change of Pacers 16, 17, 18, and 19.

TEACHING STRATEGIES

ANTICIPATED STUDENT BEHAVIORS

CHANGE OF PACER

f Pacers 16, 17, 18, and 19.

ACTIVITY 4-15

Activity name suggested by class:

Teacher____________________

BSCS USE: Post___ Tally___ Rev___

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s)____________ Comment:

Specific Questions:

12. Was a visit to the supermarket difficult to arrange? ☐ No ☐ Yes Comment:

13. Were all food storage departments made available to the students? ☐ Yes ☐ No
Comment:

BSCS Evaluation:

☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

11. Your rating of this activity:

☐ Worthwhile --keep as is	☐ Of value--needs the revision suggested	☐ Worth salvaging--make major changes described	☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s)______________ Comment:

Specific Questions:

12. Was a visit to the supermarket difficult to arrange? ☐ No ☐ Yes Comment:

13. Were all food storage departments made available to the students? ☐ Yes ☐ No
Comment:

Teacher ______________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

BSCS Evaluation: E

BSCS Evaluation: EMH Feedback Form 1d

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff (we will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

3. Recognize the role of decomposers in the cycling process.

Core B Objectives for the Student:

1. Recognize the role microbes play in the decomposition process.

2. Discover the environmental requirements of microbes and other decomposers.

4. Conclude that microbes contribute to man's well-being as well as pose problems for man.

ENVIRONMENTAL THEME:

Interrelationships of Environmental Components, Complementarity of Organisms and Environment, Cyclic Nature of Processes

INQUIRY SKILLS:

Associating, Describing, Applying

PROBLEM-SOLVING SKILLS:

Explaining, Defending, Answering Why Questions

PRACTICAL APPLICATION:

Speaking Before a Group, Food Storage in the Home

IVITY

ls for the Student:
Recognize the role of decomposers in the cycling process.

bjectives for the Student:
Recognize the role microbes play in the decomposition process.

Discover the environmental requirements of microbes and other decomposers.

Conclude that microbes contribute to man's well-being as well as pose problems for man.

THEME:
ationships of Environmental Components,
ntarity of Organisms and Environment,
ature of Processes

S:
ing, Describing, Applying

NG SKILLS:
ng, Defending, Answering Why Questions

LICATION:
Before a Group, Food Storage in the

BSCS

UNIT IV. TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT

CORE B. DECOMPOSERS IN MY ENVIRONMENT

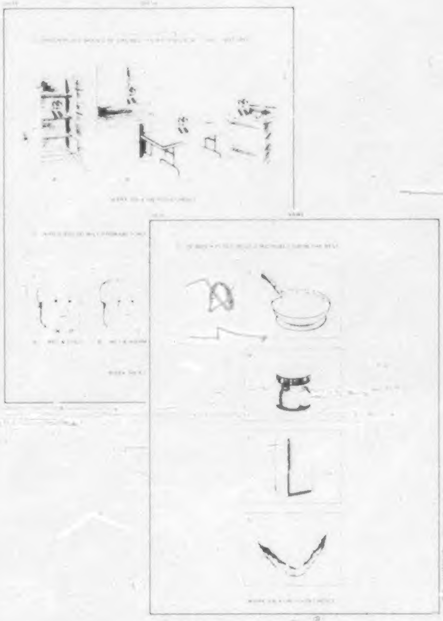
ACTIVITY 4-16. CLUES TO SUCCESS

ACTIVITY
4-16

MATERIALS

Slides 4-24 through 4-26
Worksheet 4-6
*Groceries (at least 20 items of great variety)
*35 mm Slide projector

Worksheet 4-6



*Not furnished in materials kit

TEACHING STRATEGIES

Activity 4-16. Clues to Success

This clue to success consists of two parts. In Part I students will discuss real foods and their storage. Part II consists of three multiple-choice questions designed to assess the practical aspects of food storage.

Review the last series of experiences by having the students explain how to preserve a variety of real and everyday foods. Display a wide variety of real foods. Your weekly groceries or the home economics teacher's supplies would be appropriate.

Have all students take turns in selecting a food and explaining to the class these things:

1. What is it?
2. Where does it come from (if possible)?
3. How did it get from there to you? What was done to it before reaching you?
4. How do you store it at home?
5. Do you do anything to the food before eating it? (Do you cook it?)
6. Does it spoil easily?
7. Do you eat this food often?
8. Does your body need this sort of food?
9. Is it expensive?

When each student has had a turn, continue discussing more foods as time and interest allow.

After completing this discussion, distribute Worksheet 4-6 and have students put their names on them.

Project a slide of each question separately. (Slides 4-24 through 4-26.) Read the questions and choices aloud at least twice. Allow ample time for them to mark their worksheets. Repeat this procedure for the next two questions.

TEACHING STRATEGIES

Clues to Success

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discuss real foods and their storage.
ts of three multiple-choice questions
sess the practical aspects of food storage.

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tudents put their names on them.

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-26.) Read the questions and choices aloud.
. Allow ample time for them to mark their
epeat this procedure for the next two

ANTICIPATED STUDENT BEHAVIORS

During this activity, each student should:

--participate in a discussion of food storage using real foods as a basis
--answer the questions on their worksheets.

Students should:

--place an X on the refrigerator in Question 1.

MATERIALS

Slide 4-24, Question 1

Slide 4-25, Question 2

Slide 4-26, Question 3

TEACHING STRATEGIES

After all students have had the opportunity to answer all of the questions, collect the worksheets. Again project each slide and discuss the answers with them. Have them defend their choices. After class, tally the students' answers on Tallysheet 4-4. Consider whether the whole class needs further review or if a few individuals need special attention before proceeding to the next activity.

Interpreting and Scoring:

Items 1, 2, and 3 assess the understanding that food storage entails controlling the environment of microbes. The problem-solving skill involved is answering questions by applying knowledge gained in experiments done in this unit. To be rated successful, students must answer two of the three items correctly. Review previous activities for those who need help in grasping this concept.

Using Tallysheet 4-4, turn to the Problem-solving page of the Student Record of Progress. Find the column marked Activity 4-16, "Food Storage," and circle YES if students mark two out of the three questions correctly. Otherwise, circle NO. Then send the tallysheet to BSCS.

TEACHING STRATEGIES

ts have had the opportunity to answer
ions, collect the worksheets. Again
de and discuss the answers with them.
their choices. After class, tally the
s on Tallysheet 4-4. Consider whether
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Scoring:

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rd of Progress. Find the column marked
Food Storage," and circle YES if students
he three questions correctly. Otherwise,
send the tallysheet to BSCS.

ANTICIPATED STUDENT BEHAVIORS

Students should:

--place an X on the "wet and warm" in Question 2.

--place an X on the sandwich in Question 3.

Upon completion of this activity, each student should, as a minimum:

--have discussed at least one food with emphasis on Questions 1-8
--have completed Worksheet 4-6.

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

3. Recognize the role of decomposers in the cycling process.

Core B Objectives for the Student:

1. Recognize the role microbes play in the decomposition process.

3. Appreciate how knowledge of decomposers can improve man's environment.

4. Conclude that microbes contribute to man's well-being as well as pose problems for man.

ENVIRONMENTAL THEME:

Interrelationships of Environmental Components, Complementarity of Organisms and Environment

INQUIRY SKILLS:

Applying, Predicting

PROBLEM-SOLVING SKILLS:

Drawing Conclusions

PRACTICAL APPLICATION:

Learning Food-making Skills (baking)

TIVITY

als for the Student:
Recognize the role of decomposers in the cycling process.

Objectives for the Student:
Recognize the role microbes play in the decomposition process.

Appreciate how knowledge of decomposers can improve man's environment.

Conclude that microbes contribute to man's well-being as well as pose problems for man.

THEME:
lationships of Environmental Components,
entarity of Organisms and Environment

LS:
, Predicting

ING SKILLS:
Conclusions

LICATION:
Food-making Skills (baking)

BSCS

UNIT IV.	TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT
CORE B.	DECOMPOSERS IN MY ENVIRONMENT
ACTIVITY 4-17.	A REAL GAS

ACTIVITY
4-17

MATERIALS

2 Flasks, 250 ml, widemouthed
2 Rubber stoppers, No. 8, one-hole
2 Pieces tygon tubing, 18 inches long
2 Pieces acrylic tubing, 3 inches long
2 Beakers, 400 ml
2 Water pipes
Carbon dioxide test solution (bromthymol blue)
Measuring spoons
2 Measuring cups
3 Packages dried yeast
*1 Can frozen concentrated grape juice; nonconcentrated juice has preservatives to prevent fermentation.
*2 Tablespoons sugar
*Water
*8 Cups sifted all-purpose flour
*2 Tablespoons salt
*1/4 Pound shortening
*1/4 Pound butter
*4 Large bowls
*4 Clean cloths
*2 Pans large enough to set mixing bowl in
*2 Sifters

*Not furnished in materials kit

TEACHING STRATEGIES

Activity 4-17. A Real Gas

In this activity students will realize some of the beneficial aspects of microbes. Part I develops the idea that yeasts are living microbes and introduces, on a practical level, the concept of fermentation. Part II demonstrates another beneficial use of microorganisms by man - the use of yeast in baking.

Part I. Fermenting Grape Juice

WHAT HAVE WE LEARNED ABOUT MICROBES?

As the students describe things they have learned about microbes, make a list of these items on the chalkboard.

Then ask:

ARE MICROBES ALIVE?

HOW DO YOU KNOW THAT MICROBES ARE ALIVE?

WHAT ARE SOME THINGS MICROBES CAN DO?

ARE SOME MICROBES HARMFUL TO US? WHY?

ARE THERE ANY USEFUL MICROBES?

WERE OUR COMPOST MICROBES USEFUL?

WHY?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
17. A Real Gas *ivity students will realize some of the bene-cts of microbes. Part I develops the idea are living microbes and introduces, on a evel, the concept of fermentation. Part II s another beneficial use of microorganisms by se of yeast in baking.*	*During this activity, each student should:* *--observe the demonstration of wine fermentation* *--infer that yeasts are living organisms* *--recognize the role of yeast in making wine* *--participate in making bread* *--recognize the role of yeast in making bread* *--infer that some microbes are beneficial to man.*
rmenting Grape Juice	Students should:
AVE WE LEARNED ABOUT MICROBES?	--recall and describe various facts about microbes, such as, "They grow better in wet and warm places," "They breathe," "They're alive," and so forth.
ents describe things they have learned about ake a list of these items on the chalkboard.	
CROBES ALIVE?	--respond, "Yes."
YOU KNOW THAT MICROBES ARE ALIVE?	--cite evidence such as growth, eating things, and making things smell bad and respond, "They breathe," "They rot things."
RE SOME THINGS MICROBES CAN DO?	--recall, "Cause bread to get moldy," "Cause disease."
ME MICROBES HARMFUL TO US? WHY?	--recall Unit II and respond, "Yes," "They make us sick."
ERE ANY USEFUL MICROBES?	--recall composting setup and respond, "Yes."
UR COMPOST MICROBES USEFUL?	--respond, "Yes."
	--respond, "They broke down the garbage," "They made the soil better."

ACTIVITY 4-16

Activity name suggested by class:

Teacher___________________

BSCS USE: Post___ Tally___ Rev___

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s)______________ Comment:

Specific Questions:

12. Were any questions on Worksheet 4-6 not useful? ☐ No ☐ Yes: Which ones?__________
Explain:

13. Did students attempt to defend their worksheet answers? ☐ No ☐ Yes
What were their arguments?

BSCS Evaluation:

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

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☐ Worthwhile --keep as is
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Specific Questions:

12. Were any questions on Worksheet 4-6 not useful? ☐ No ☐ Yes: Which ones?__________
Explain:

13. Did students attempt to defend their worksheet answers? ☐ No ☐ Yes
What were their arguments?

14. Do you have other questions to suggest for this assessment?

15. Please send in Tallysheet 4-4 and Student Worksheet 4-6.

BSCS Evaluation: EMH Feedback Form 1d

Side A

Teacher ______________________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff (we will read and respond immediately):

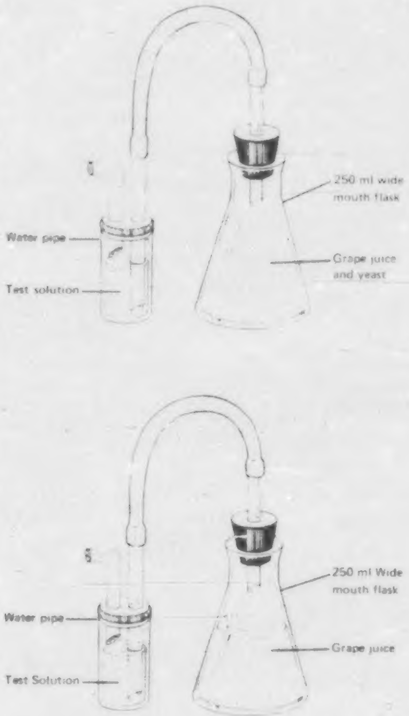
Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

BSCS Evaluation: EMH Feedback Form 1d

MATERIALS

Diagram 4-8


250 ml wide mouth flask
Water pipe
Grape juice and yeast
Test solution
250 ml Wide mouth flask
Water pipe
Grape juice
Test Solution

TEACHING STRATEGIES

TODAY WE ARE GOING TO SEE SOME OTHER GOOD THINGS MICROBES DO WHEN THEY BREAK THINGS DOWN.

Hold up a package of yeast and ask:

WHAT IS THIS?

WHAT IS YEAST?

YEAST IS A MICROBE.

ARE YEAST MICROBES ALIVE?

HOW COULD WE FIND OUT IF YEAST MICROBES ARE ALIVE?

IF YEAST MICROBES ARE ALIVE, WHAT WOULD THEY NEED TO GROW AND STAY ALIVE?

WE ARE GOING TO SEE IF WE CAN FEED OUR YEAST SOME GRAPE JUICE. WHAT DO YOU SUPPOSE WILL HAPPEN IF WE PUT YEAST IN GRAPE JUICE?

Set up the demonstration as follows. (See Diagram 4-8.) Allow students to assist you wherever possible.

1. Prepare grape juice according to the directions on the container.

2. Fill two 250 ml widemouthed flasks about one-half full of grape juice.

3. Add one tablespoon sugar to each flask.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
RE GOING TO SEE SOME OTHER GOOD ROBES DO WHEN THEY BREAK THINGS	
ge of yeast and ask:	
IS?	--respond, "Yeast."
AST?	--respond, "I don't know," "Powder," "Something you use to make bread."
MICROBE.	
MICROBES ALIVE?	--probably respond, "No," "Could be."
WE FIND OUT IF YEAST MICROBES ARE	--suggest various responses such as, looking at them, feeding them, seeing if they will grow, seeing if they breathe.
ICROBES ARE ALIVE, WHAT WOULD THEY OW AND STAY ALIVE?	--suggest they would need food.
NG TO SEE IF WE CAN FEED OUR YEAST JUICE. WHAT DO YOU SUPPOSE WILL WE PUT YEAST IN GRAPE JUICE?	--respond, "I don't know," "Make bubbles," "The yeast will eat the grape juice," "The grape juice will disappear."
nstration as follows. (See Diagram 4-8.) to assist you wherever possible.	
rape juice according to the directions ntainer.	
250 ml widemouthed flasks about one- of grape juice.	
ablespoon sugar to each flask.	

MATERIALS

TEACHING STRATEGIES

4. To one flask only add one-half teaspoon of dried yeast.

5. Label the one flask "grape juice" and the other "grape juice and yeast."

6. Add water to each water pipe up to the mark. Add five or six drops of carbon dioxide test solution (bromthymol blue) to each water pipe. Swirl gently to mix.

When both setups are completely assembled, ask:

WHY DID I CONNECT THE BOTTLE CONTAINING THE YEAST TO THE BLUE VIAL?

HOW WILL I KNOW IF YEAST CAN GIVE OFF CARBON DIOXIDE?

Next, point to the setup containing the grape juice, and say:

WHAT DO YOU THINK WILL HAPPEN TO THE TEST SOLUTION CONNECTED TO THE GRAPE JUICE WITH NO YEAST?

WHY DO YOU THINK THERE SHOULD BE NO COLOR CHANGE?

WE WILL LEAVE THESE SET UP OVERNIGHT AND WILL EXAMINE THEM TOMORROW.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
ne flask only add one-half teaspoon of dried t.	
l the one flask "grape juice" and the other pe juice and yeast."	
water to each water pipe up to the mark. five or six drops of carbon dioxide test tion (bromthymol blue) to each water pipe. l gently to mix.	
setups are completely assembled, ask:	
ID I CONNECT THE BOTTLE CONTAINING THE TO THE BLUE VIAL?	--recall Activity 4-12 and say, "To see if they give off carbon dioxide."
ILL I KNOW IF YEAST CAN GIVE OFF CARBON DE?	--recall previous work and predict, "The test solution will turn yellow."
t to the setup containing the grape juice, and	
O YOU THINK WILL HAPPEN TO THE TEST ON CONNECTED TO THE GRAPE JUICE WITH ST?	--predict that there would be no color change.
YOU THINK THERE SHOULD BE NO COLOR CHANGE?	--respond, "No yeast in it," "It's a control," "No breathing."
L LEAVE THESE SET UP OVERNIGHT AND WILL E THEM TOMORROW.	

MATERIALS

TEACHING STRATEGIES

Ask:

WHAT CHANGE HAS OCCURRED IN THE SETUP WITH THE YEAST?

WHAT TELLS US THAT YEAST MICROBES ARE ALIVE?

WHAT HAPPENED TO THE SETUP WITH NO YEAST?

WHAT DOES THIS TELL US?

Remove the stopper from the flask containing the plain grape juice and ask several students to smell it. Then have them smell the fermented grape juice from the other flask.

Ask:

DO THEY SMELL THE SAME?

HOW DOES THE GRAPE JUICE SMELL?

HOW DOES THE GRAPE JUICE WITH YEAST SMELL?

HOW CAN YOU EXPLAIN THE DIFFERENCE IN THE SMELL?

HOW COULD THE YEAST CAUSE THE GRAPE JUICE TO CHANGE INTO WINE?

WAITING T

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
WAITING TIME	
GE HAS OCCURRED IN THE SETUP WITH THE	--respond, "Solution has changed to yellow."
S US THAT YEAST MICROBES ARE ALIVE?	--respond, "Yeast gives off carbon dioxide," "Yeast makes bubbles."
ENED TO THE SETUP WITH NO YEAST?	--respond, "Nothing," "The solution is still blue."
THIS TELL US?	--reply, "Nothing was breathing," "No microbes are in it," "No carbon dioxide made."
pper from the flask containing the plain d ask several students to smell it. Then the fermented grape juice from the other	
ELL THE SAME?	--respond, "No."
HE GRAPE JUICE SMELL?	--respond, "Good," "Like grape juice."
HE GRAPE JUICE WITH YEAST SMELL?	--reply, "Bad," "Like wine," "Stinky," "Like booze."
U EXPLAIN THE DIFFERENCE IN THE SMELL?	--infer that the difference must be the result of the yeast and respond, "Yeast makes it turn into wine," "Yeast makes it stink."
THE YEAST CAUSE THE GRAPE JUICE TO O WINE?	--infer that the change must have been caused by something that the yeast gave off or did, "Yeast ate the grape juice and made wine," "The carbon dioxide did it."

MATERIALS

BREAD RECIPE:

- 1 Measuring cup
- *1 Package quick acting yeast
- *2 Cups lukewarm water
- *4 Cups sifted all-purpose flour
- *1 Tablespoon salt
- *2 Large bowls
- *2 Clean cloths
- *1 Sifter
- *2 Bread pans
- *1 Pan large enough to set mixing bowl in
- *Shortening to grease pans
- *Butter

*Not furnished in materials kit

TEACHING STRATEGIES

Discuss all student responses. Finally say:

> YEAST MICROBES ARE LIVING. WHEN YEAST MICROBES EAT SOMETHING LIKE GRAPE JUICE, THEY GIVE OFF A GAS AND ALCOHOL. MAN USES YEAST MICROBES TO MAKE WINE AND BEER. THE SMELL IN THE FLASK WITH THE YEAST WAS DUE TO ALCOHOL.

Caution students against drinking any of the wine. Explain that wine produced under such conditions may not be safe to drink.

> DO YOU THINK THAT ALL MICROBES ARE HARMFUL TO MAN?

Discuss student responses. If students suggest the harmful effects of alcohol and maintain that microbes are bad, ask if they can think of any way that microbes such as yeast may help us. Defer further discussion until the next portion of the activity is completed.

Part II. Making Bread

The recipe that is given is extremely simple - anyone ca do it! It is fail safe - you can't miss. If you are particularly nervous about it, you might enlist the aid of the school home economics teacher. Two batches of bread will be made, one with yeast and one without yeast. Students will observe the effects of yeast in making bread, both in the rising and in the baking of

TEACHING STRATEGIES

student responses. Finally say:

MICROBES ARE LIVING. WHEN YEAST MICROBES
METHING LIKE GRAPE JUICE, THEY GIVE OFF
AND ALCOHOL. MAN USES YEAST MICROBES TO
INE AND BEER. THE SMELL IN THE FLASK WITH
AST WAS DUE TO ALCOHOL.

dents against drinking any of the wine.
t wine produced under such conditions may not
drink.

THINK THAT ALL MICROBES ARE HARMFUL
?

dent responses. If students suggest the
ects of alcohol and maintain that microbes
k if they can think of any way that microbes
st may help us. Defer further discussion
ext portion of the activity is completed.

aking Bread

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is fail safe - you can't miss. If you are
nervous about it, you might enlist the aid
l home economics teacher. Two batches of
e made, one with yeast and one without
dents will observe the effects of yeast in
, both in the rising and in the baking of

ANTICIPATED STUDENT BEHAVIORS

Students should:

--respond, "No." Some students may suggest that yeasts are bad since drinking alcohol may be harmful.

MATERIALS

NOTE: You will need enough ingredients for four loaves of bread; two with yeast and two without yeast. The above ingredients make two loaves.

TEACHING STRATEGIES

the product. If you have a stove at school to bake the two batches of bread, use that. The results will be dramatic. If not, terminate the experiment after the students observe the difference in rising of the four loaves; then take the dough home and bake it. Bring the four loaves the next day.

Begin the experiment by asking:

> WHAT MATERIALS WOULD WE NEED IN ORDER TO MAKE A LOAF OF BREAD?

Then say:

> WHAT IS YEAST?
>
> WHY DO YOU SUPPOSE YEAST IS USED IN MAKING BREAD?
>
> DO YOU THINK IT WOULD MAKE ANY DIFFERENCE IF BREAD WAS MADE WITHOUT YEAST?
>
> HOW COULD WE FIND OUT?
>
> IF WE MADE SOME BREAD WITH YEAST AND SOME WITHOUT YEAST, WHAT WOULD YOU PREDICT WOULD HAPPEN?
>
> LET'S MAKE FOUR LOAVES OF BREAD, TWO WITH YEAST AND TWO WITHOUT, AND SEE WHAT HAPPENS.

Divide the students into two groups. One group will make the unleavened bread, the other group will make the yeast bread. Copy the recipes below on the chalkboard or ditto them for students to follow.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
you have a stove at school to bake the read, use that. The results will be t, terminate the experiment after the the difference in rising of the four e the dough home and bake it. Bring the next day.	
ment by asking:	
ALS WOULD WE NEED IN ORDER TO MAKE READ?	--recall and respond, "Flour," "Salt," "Sugar," and "Yeast."
ST?	--recall the grape juice activity and respond, "Microbes," "Good microbes."
SUPPOSE YEAST IS USED IN MAKING	--respond, "Don't know," "Makes it rise," "To make it taste better."
K IT WOULD MAKE ANY DIFFERENCE IF ADE WITHOUT YEAST?	--suggest making bread with and without yeast.
E FIND OUT?	--suggest making bread with and without yeast.
SOME BREAD WITH YEAST AND SOME WITHOUT WOULD YOU PREDICT WOULD HAPPEN?	--probably predict with considerable variety what would happen to the loaves of bread.
FOUR LOAVES OF BREAD, TWO WITH YEAST HOUT, AND SEE WHAT HAPPENS.	
nts into two groups. One group will make read, the other group will make the yeast recipes below on the chalkboard or ditto to follow.	

ACTIVITY
4-17

MATERIALS

TEACHING STRATEGIES

Bread Recipe (Leavened)

Dissolve by stirring, one package of yeast in one cup of lukewarm water. While the yeast softens, sift the flour sugar, and salt together in the large bowl, then stir in the dissolved yeast. Add enough of the second cup of water to hold the dough together. With greased hands, mix until you have a soft, rather sticky dough. Place the bowl in a pan of warm water, cover the dough with a moist, clean cloth, and let rise until it doubles in size (two to four hours).

Punch the raised dough down with your fist and give it a good beating. Don't knock all the air bubbles out. Place the dough in two greased 9 X 5 X 3 inch loaf baking pans. Cover and let the dough rise until it reaches the top of the pan or doubles in size. Then bake at 400 degrees for one hour. If crust begins to burn or gets too brown, cover with aluminum foil. Brush the top with melted butter.

Bread Recipe (Unleavened)

Sift flour, sugar and salt together in large bowl. Add enough water to hold dough together. With greased hands mix until you have a soft, rather sticky dough. Place the bowl in a pan of warm water, cover the dough with a moist clean cloth. Let stand for two to four hours.

Place the dough in two greased 9 X 5 X 3 inch loaf bakin pans. Cover and let stand about 30 minutes. Bake at 400 degrees for one hour. If crust begins to burn, cove with aluminum foil.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS

pe (Leavened)

y stirring, one package of yeast in one cup of
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ng. Don't knock all the air bubbles out.
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ts too brown, cover with aluminum foil. Brush
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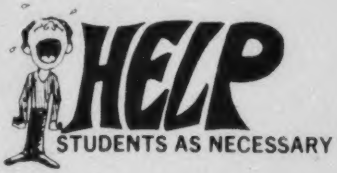
num foil.



MATERIALS

TEACHING STRATEGIES

The difference between the two sets of loaves should be dramatic. The difference will be apparent both before and after baking.

When the baking of the loaves has been completed, ask:

> WHAT DIFFERENCE DO YOU SEE IN THE TWO SETS OF LOAVES OF BREAD?

> WHAT DO YOU THINK MADE THIS DIFFERENCE?

> THINK ABOUT WHAT HAPPENED WHEN WE PUT YEAST IN THE GRAPE JUICE. CAN YOU EXPLAIN WHY TWO LOAVES OF BREAD GOT LARGER?

Review the grape juice experiment if necessary to elicit the desired response.

> DO YOU THINK THE TWO SETS OF LOAVES WILL TASTE ANY DIFFERENT?

Allow students to taste each of the loaves.

Then ask:

> WHICH KIND OF BREAD WOULD YOU RATHER HAVE IN A SANDWICH?

> WHY?

> HOW COULD YEAST MAKE THE BREAD TASTE DIFFERENT?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
etween the two sets of loaves should be ifference will be apparent both before .	
of the loaves has been completed, ask:	
ENCE DO YOU SEE IN THE TWO SETS OF READ?	--respond that the loaves without the yeast are smaller and flatter.
THINK MADE THIS DIFFERENCE?	--recognize that the yeast must have made the difference since it was the only thing that was different in the two sets of loaves.
WHAT HAPPENED WHEN WE PUT YEAST IN UICE. CAN YOU EXPLAIN WHY TWO READ GOT LARGER?	--suggest that the yeast must have caused the bread to rise and respond, "The yeast made the bread rise."
juice experiment if necessary to ed response.	
K THE TWO SETS OF LOAVES WILL TASTE NT?	--respond, "Yes," "No," "Maybe."
o taste each of the loaves.	
OF BREAD WOULD YOU RATHER HAVE IN A	--respond, "The one with the yeast."
	--respond, "It tastes better," "Not so hard."
EAST MAKE THE BREAD TASTE DIFFERENT?	--suggest that something must be given off by the yeast that makes the bread taste better and respond, "The microbes make it taste good," "There's more air in it," "The yeast is the difference."

ACTIVITY
4-17

MATERIALS

TEACHING STRATEGIES

ARE ALL MICROBES BAD FOR US?

WE HAVE SEEN THAT YEAST MICROBES MAY BE HELPFUL. THERE ARE LOTS OF OTHER HELPFUL MICROBES. SOME ARE USED TO MAKE CHEESE, OTHERS HELP MAKE SAUERKRAUT, AND OTHERS ARE USED TO MAKE MEDICINES THAT HELP US GET WELL WHEN WE ARE SICK. SCIENTISTS TELL US THAT THERE ARE MANY MORE MICROBES THAT HELP US THAN THERE ARE MICROBES THAT ARE HARMFUL TO US.

CHANG

See Change of Pacer 20.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
L MICROBES BAD FOR US?	--respond, "No," "There were good microbes in the bread."
E SEEN THAT YEAST MICROBES MAY BE HELPFUL. ARE LOTS OF OTHER HELPFUL MICROBES. SOME ED TO MAKE CHEESE, OTHERS HELP MAKE RAUT, AND OTHERS ARE USED TO MAKE MEDI- THAT HELP US GET WELL WHEN WE ARE SICK. ISTS TELL US THAT THERE ARE MANY MORE ES THAT HELP US THAN THERE ARE MICROBES RE HARMFUL TO US.	
	Upon completion of this activity, __each__ __student__ should, as a minimum:
	--have observed changes in the test solution as a result of yeast action on grape juice *--have helped make bread* *--have stated that some microbes, such as yeast, are helpful to man.*
f Pacer 20.	

CHANGE OF PACER

ACTIVITY 4-17

Activity name suggested by class:

Teacher____________________

BSCS USE: Post___ Tally___ Rev___

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

11. Your rating of this activity:

☐ Worthwhile --keep as is
☐ Of value--needs the revision suggested
☐ Worth salvaging--make major changes described
☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s)______________ Comment:

Specific Questions:

12. Did students understand what the yeast did? ☐ No ☐ Yes
If yes, what did they say to indicate this?

13. Did any students have difficulty accepting some microbes as good? ☐ No ☐ Yes
Comment:

BSCS Evaluation:

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

11. Your rating of this activity:

☐ Worthwhile --keep as is	☐ Of value--needs the revision suggested	☐ Worth salvaging--make major changes described	☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s)______________ Comment:

Specific Questions:

12. Did students understand what the yeast did? ☐ No ☐ Yes
If yes, what did they say to indicate this?

13. Did any students have difficulty accepting some microbes as good? ☐ No ☐ Yes
Comment:

Teacher ______________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff (we will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

BSCS Evaluation: EMH Feedback Form 1d

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

1. Develop an understanding of the flow of energy through the living world.

2. Develop an understanding of cycling and appreciate the cycling relationship of materials and organisms in the environment.

3. Recognize the role of decomposers in the cycling process.

5. Comprehend the role of man as an integral part _of_ nature, not apart _from_ nature.

Core B Objectives for the Student:

1. Recognize the role microbes play in the decomposition process.

ENVIRONMENTAL THEME:

Interrelationships of Environmental Components, Diversity and Pattern, Complementarity of Organisms and Environment, Cyclic Nature of Processes

INQUIRY SKILLS:

Associating, Translating

PROBLEM-SOLVING SKILLS:

Knowing Question and Task, Organizing Data

PRACTICAL APPLICATION:

Application of Knowledge to Do a Given Task

ACTIVITY

Goals for the Student:
1. Develop an understanding of the flow of energy through the living world.

2. Develop an understanding of cycling and appreciate the cycling relationship of materials and organisms in the environment.

3. Recognize the role of decomposers in the cycling process.

5. Comprehend the role of man as an integral part of nature, not apart from nature.

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TAL THEME:
relationships of Environmental Components, sity and Pattern, Complementarity of isms and Environment, Cyclic Nature ocesses

ILLS:
iating, Translating

LVING SKILLS:
ng Question and Task, Organizing Data

APPLICATION:
cation of Knowledge to Do a Given Task

BSCS

UNIT IV. TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT

CORE B. DECOMPOSERS IN MY ENVIRONMENT

ACTIVITY 4-18. ROUNDING OUT THE FOOD CHAIN

ACTIVITY
4-18

MATERIALS

1 Deck of flash cards
1 "Decomposer" flash card
4 "Decomposer" playing cards
Food Chain Game cards sorted into 4 sets of the following:

- Hawk
- Frog
- Mosquito
- Man
- Cow
- Grass
- Snake
- Frog
- Insect
- Grain
- Leaves
- Fruits
- Chicken
- Mountain lion
- Deer
- Worm
- Fish
- Pig
- Rabbit

Slide 4-27
*2 Large pieces butcher paper per team
*Felt pens
*Masking tape
*35 mm Slide projector

*Not furnished in materials kit

TEACHING STRATEGIES

Activity 4-18. Rounding Out the Food Chain

This activity climaxes Core B because it introduces the concept of a cycle and answers some of the questions posed earlier in the core. It may still be difficult for students to appreciate the very complex idea of the cyclic nature of the living world.

Begin by placing on the chalk tray the flash cards listed below in the order shown. Draw arrows between the cards.

HAWK → SNAKE → FROG → INSECTS → GRASS

Then ask:

WHAT HAVE I SHOWN AT THE BOARD?

I ASKED A QUESTION A LONG TIME AGO THAT WE COULDN'T ANSWER VERY WELL. CAN YOU ANSWER IT NOW? WHAT EATS A HAWK?

Students will probably have difficulty with this question even at this point. Continue by asking such things as:

DO HAWKS LIVE FOREVER?

WHAT HAPPENS TO DEAD HAWKS?

WHY AREN'T ANIMALS PILING UP OUTSIDE?

When students have identified and recalled the role of decomposers from their experience, add to the chain on the chalkboard by placing the large "decomposer" card to the left of the hawk card.

DECOMPOSER → HAWK → SNAKE → ETC.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
18. Rounding Out the Food Chain *ty climaxes Core B because it introduces the a cycle and answers some of the questions er in the core. It may still be difficult s to appreciate the very complex idea of the re of the living world.*	*During this activity, each student should:* *--define the word cycle* *--recognize the role of decomposers in natural cycles* *--make a representation of a natural cycle.*
lacing on the chalk tray the flash cards w in the order shown. Draw arrows between → SNAKE → FROG → INSECTS → GRASS	Students should:
AVE I SHOWN AT THE BOARD?	--recall previous work and say, "Food chain."
D A QUESTION A LONG TIME AGO THAT WE 'T ANSWER VERY WELL. CAN YOU ANSWER IT WHAT EATS A HAWK?	--respond, "Don't know," "Maybe an eagle," "Decomposers."
ll probably have difficulty with this question s point. Continue by asking such things as:	
KS LIVE FOREVER?	--recall previous experiences and answer appropriately.
APPENS TO DEAD HAWKS?	--respond, "Get stinky," "Smelly," "Get rotten," "They rot," "Decompose."
EN'T ANIMALS PILING UP OUTSIDE?	--respond, "They get eaten up," "They rot away," "They decompose."
ts have identified and recalled the role of from their experience, add to the chain on ard by placing the large "decomposer" card of the hawk card. OSER → HAWK → SNAKE → ETC.	

MATERIALS

TEACHING STRATEGIES

Then ask:

DO YOU THINK DECOMPOSERS LIVE FOREVER?

WHAT DO YOU THINK HAPPENS TO DECOMPOSERS AFTER THEY DIE?

WHERE WILL THE STUFF GO AFTER DECOMPOSERS HAVE EATEN IT AND BROKEN IT UP?

If students have difficulty with this question, review the discussion held earlier on the class compost pile. Probe and review until students tell you that decomposed things are put back into the soil.

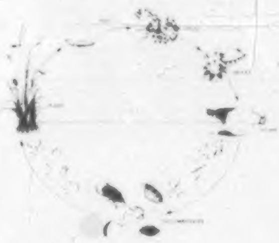
Then ask:

WHAT LIVING THINGS NEED THE PIECES OF DECOMPOSED STUFF FROM THE SOIL?

If students have difficulty with this question, ask:

WHAT LIVING THINGS NEED SOIL TO GROW?

Slide 4-27



Now project Slide 4-27. This slide summarizes the food chain just discussed and at the same time, introduces decomposers as an important link in food chains. In fact, it transforms a chain into a cycle. Carefully explain and discuss what the slide illustrates. Say:

WE'VE LEARNED THAT A PLANT IS PART OF EVERY FOOD CHAIN. IN THIS SLIDE, WHAT IS EATING THE GRASS?

Continue the questioning in a similar manner until you reach the hawk. Then say:

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
NK DECOMPOSERS LIVE FOREVER?	--respond, "Yes," "No," "Don't know."
J THINK HAPPENS TO DECOMPOSERS AFTER	--speculate, "Eaten by other decomposers," "Eaten by microbes," "Go into soil," "Nothing."
THE STUFF GO AFTER DECOMPOSERS IT AND BROKEN IT UP?	--respond, "Into the soil."
e difficulty with this question, review held earlier on the class compost pile. y until students tell you that decomposed back into the soil.	
THINGS NEED THE PIECES OF STUFF FROM THE SOIL?	--respond, "Plants."
e difficulty with this question, ask:	
THINGS NEED SOIL TO GROW?	--respond, "Plants."
e 4-27. This slide summarizes the food ssed and at the same time, introduces n important link in food chains. In rms a chain into a cycle. Carefully uss what the slide illustrates. Say:	
ED THAT A PLANT IS PART OF EVERY IN THIS SLIDE, WHAT IS EATING	--respond, "Insect," "Moth."
stioning in a similar manner until you Then say:	

MATERIALS

TEACHING STRATEGIES

WHAT HAS HAPPENED TO THE HAWK?

> If the students don't make this inference or question the reasons for the hawk's death, remind them that while other animals don't normally eat hawks, they don't live forever.

Ask:

WHAT DID WE SAY HAPPENS TO HAWKS OR OTHER ANIMALS WHEN THEY DIE?

WHAT IS IN THE GROUND THAT CAUSES THE HAWK TO DECOMPOSE?

DO YOU THINK THE MICROBES THAT HELP DECOMPOSE THE HAWK ARE GOOD OR BAD?

> If the students don't recognize the beneficial effects of these microbes, ask:
>
> WHAT WOULD YOUR ENVIRONMENT BE LIKE IF MICROBES DIDN'T HELP DECOMPOSE DEAD PLANTS AND ANIMALS?
>
> ARE MICROBES HELPING OR HURTING US BY DECOMPOSING DEAD THINGS?
>
> HOW DO THEY HELP US?

Then ask:

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
HAS HAPPENED TO THE HAWK?	--infer that the hawk is dead, "Fallen to ground," "Probably was shot down," "It's dead."
If the students don't make this inference or question the reasons for the hawk's death, remind them that while other animals don't normally eat hawks, they don't live forever.	
DID WE SAY HAPPENS TO HAWKS OR OTHER LS WHEN THEY DIE?	--respond, "They rot," "They go into the ground," "They decompose."
IS IN THE GROUND THAT CAUSES THE HAWK TO POSE?	--respond, "Bugs," "Microbes," "Water," "I don't know."
THINK THE MICROBES THAT HELP DECOMPOSE WK ARE GOOD OR BAD?	--respond, "Good," "Bad," "I don't know."
If the students don't recognize the beneficial effects of these microbes, ask:	
HAT WOULD YOUR ENVIRONMENT BE LIKE IF ICROBES DIDN'T HELP DECOMPOSE DEAD LANTS AND ANIMALS?	--respond, "Be a lot of dead things around," "Everything would smell."
RE MICROBES HELPING OR HURTING US BY ECOMPOSING DEAD THINGS?	--respond, "Helping us."
OW DO THEY HELP US?	--respond, "Keep dead things from piling up."

MATERIALS

TEACHING STRATEGIES

WHAT HAPPENS TO THE HAWK AS IT DECOMPOSES?

> If students fail to recognize that the hawk's remains gradually disappear into the ground, ask:
>
> AS THE HAWK BREAKS UP INTO LITTLE PIECES, WHERE DO THESE PIECES GO?

Continue by asking:

IF SOME OF THE PIECES GO INTO THE GROUND, WHAT DOES THIS DO TO THE SOIL?

> If students do not see that adding decaying material is beneficial, help them to recall the compost activities. Say:
>
> WHAT WAS ADDED TO SOIL TO MAKE OUR COMPOST?
>
> WHAT HAPPENS TO THIS STUFF AFTER MANY DAYS?
>
> WHAT DOES THIS DO TO THE SOIL?

Summarize this line of inquiry by saying:

WE CAN MAKE COMPOST BY CUTTING THINGS UP AND ADDING THEM TO MOIST SOIL FOR DECOMPOSERS TO BREAK UP. THE SAME THING HAPPENS OUT IN THE FIELDS AND IN THE WOODS WHEN PLANTS AND ANIMALS DIE. IT MAY TAKE A LITTLE LONGER, BUT IN THE END THE DEAD MATERIAL IS DECOMPOSED AND BECOMES A PART OF THE SOIL.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
S TO THE HAWK AS IT DECOMPOSES?	--respond, "It stinks," "It breaks up," "Goes into the dirt."
dents fail to recognize that the remains gradually disappear into ound, ask: HAWK BREAKS UP INTO LITTLE WHERE DO THESE PIECES GO?	--reply, "Goes into the ground," "Blown away."
ng: HE PIECES GO INTO THE GROUND, IS DO TO THE SOIL?	--respond, "Makes it better," "I don't know," "Nothing," "Fertilizes the soil."
dents do not see that adding decaying l is beneficial, help them to the compost activities. Say: S ADDED TO SOIL TO MAKE OUR ?	--respond, "Garbage," "Food," "Glass."
PPENS TO THIS STUFF AFTER MANY	--respond, "It changes color," "It gets smaller," "It breaks up."
ES THIS DO TO THE SOIL?	--respond, "Fertilizes it," "Makes it richer."
ne of inquiry by saying: COMPOST BY CUTTING THINGS UP AND TO MOIST SOIL FOR DECOMPOSERS TO HE SAME THING HAPPENS OUT IN THE N THE WOODS WHEN PLANTS AND ANIMALS TAKE A LITTLE LONGER, BUT IN THE MATERIAL IS DECOMPOSED AND RT OF THE SOIL.	

MATERIALS

TEACHING STRATEGIES

Direct attention to the slide again, and ask:

> DOES GRASS REALLY EAT DECOMPOSERS?

Point to arrow between plants and decomposers.

> THIS ARROW MEANS THAT PLANTS NEED DECOMPOSERS. ALTHOUGH THEY DON'T EAT DECOMPOSERS, THEY NEED WHAT THE DECOMPOSERS PUT INTO THE SOIL TO MAKE THEIR FOOD.

You must help students a great deal at this point and explain to them that materials are cycled through nature and that a "piece" of an animal may very well end up in a plant. Point to the roots of the grass on the slide and say:

> ALONG WITH WATER, THE ROOTS OF PLANTS TAKE IN TINY PIECES OF THE HAWK, AND PIECES FROM OTHER DECOMPOSING PLANTS AND ANIMALS. THESE MATERIALS MOVE UP INTO THE LEAVES WHERE THEY ARE USED BY THE PLANT IN MAKING FOOD.

It may be necessary to emphasize that the "pieces" we are talking about are not visible. They are too small to be seen with the eye. They are even too small to be seen with the students' microscopes.

Introduce the word "cycle" to your students now by making a circular, sweeping motion with your arm in the direction of the arrows on the slide. Say:

> WHAT KIND OF FIGURE DO THE ARROWS FORM?

Write the word "cycle" on the chalkboard. Then say:

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
ntion to the slide again, and ask:	
RASS REALLY EAT DECOMPOSERS?	--respond, "No," "Yes," "Don't know."
row between plants and decomposers.	
RROW MEANS THAT PLANTS NEED DECOMPOSERS. GH THEY DON'T EAT DECOMPOSERS, THEY NEED HE DECOMPOSERS PUT INTO THE SOIL TO MAKE FOOD.	
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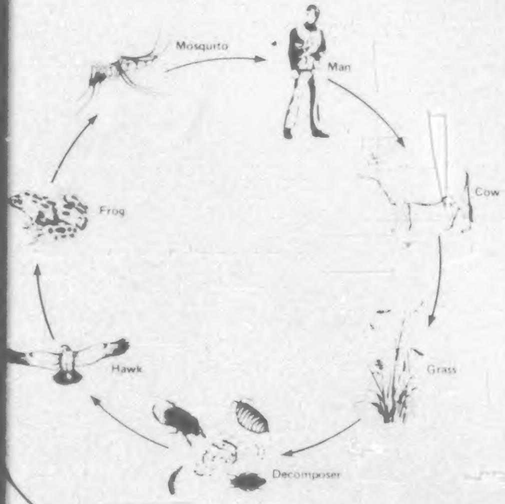
e word "cycle" to your students now by rcular, sweeping motion with your arm in the the arrows on the slide. Say:	
ND OF FIGURE DO THE ARROWS FORM?	--respond, "A circle."
ord "cycle" on the chalkboard. Then say:	

MATERIALS

Diagram 4-9



TEACHING STRATEGIES

WE WILL USE THE WORD "CYCLE" FOR THINGS THAT GO AROUND IN CIRCLES.

WHAT IS A WORD YOU USE THAT HAS THE WORD "CYCLE" IN IT?

WHAT IS GOING AROUND IN CIRCLES IN A MOTORCYCLE?

Explain that bicycle, tricycle, etc., do stem from the word "cycle" and circles.

The idea of cycles may not be an easy one for your students. Be patient and give them assistance.

Divide the class in teams of four and distribute to each group the hawk, frog, mosquito, man, cow, and grass cards from the decks of Food Chain Game cards. Also distribute a "decomposer" card. Give each group a square piece of butcher paper.

Direct each group to make an example of a cycle by arranging the cards in a circle on a piece of butcher paper. Put a piece of masking tape on the back of the cards to hold them in place. Have them connect their pictures with arrows drawn with the felt pens. Assist them in the task but do not tell them what to do.

WOR
TIM

Only one cycle will be probable for the groups. Check to see that they know the concept of cycle and have arranged cards in the order indicated in Diagram 4-9.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
THE WORD "CYCLE" FOR THINGS THAT N CIRCLES.	
ORD YOU USE THAT HAS THE WORD IT?	--respond, "Motorcycle."
NG AROUND IN CIRCLES IN A	--respond, "The wheels."
ycle, tricycle, etc., do stem from the circles.	
es may not be an easy one for your tient and give them assistance.	
in teams of four and distribute to each frog, mosquito, man, cow, and grass ecks of Food Chain Game cards. Also omposer" card. Give each group a butcher paper.	
to make an example of a cycle by rds in a circle on a piece of butcher ce of masking tape on the back of the m in place. Have them connect their rows drawn with the felt pens. Assist but do not tell them what to do.	
ll be probable for the groups. Check to w the concept of cycle and have arranged r indicated in Diagram 4-9.	

MATERIALS

TEACHING STRATEGIES

Have each group display their cycles by attaching their pieces of butcher paper to the chalkboard. Ask for volunteers to explain their cycles to the class.

Make sure at this time that students understand the concept of the cycle.

Continue the activity by saying:

> YOU HAD ONLY SEVEN CARDS TO USE IN YOUR POSTER. NOW I'M GOING TO GIVE EACH GROUP MORE CARDS. YOU ARE TO MAKE ANOTHER FOOD CYCLE WITH SOME OF THESE CARDS. YOU CAN USE THE CARDS FROM YOUR FIRST CYCLE IF YOU WISH. USE FELT PENS AS YOU DID BEFORE TO SHOW THE CYCLE.

Distribute butcher paper again to each group and the additional cards from the Food Chain Game.

Leaves
Mouse
Chicken
Mountain lion
Grain
Deer
Snake
Worm
Insects
Pig
Rabbit

Have each group display and explain the food cycle they have constructed. In the discussion be sure students understand how decomposers turn the food chain into a cycle.

At this point, have students review *The Long Journey* to answer the question on the last page. Have them discuss what would follow the possibilities of cutting their hair and throwing it away, and their dying.

TEACHING STRATEGIES

group display their cycles by attaching their butcher paper to the chalkboard. Ask for to explain their cycles to the class.

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n
in lion

Snake
Worm
Insects
Pig
Rabbit

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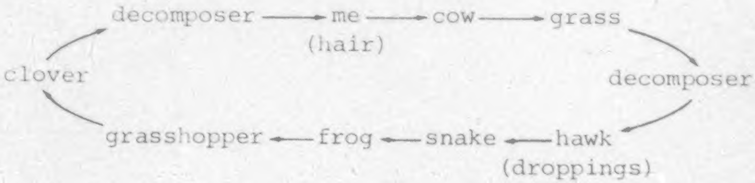
nt, have students review *The Long Journey* e question on the last page. Have them t would follow the possibilities of cutting and throwing it away, and their dying.

ANTICIPATED STUDENT BEHAVIORS

MATERIALS

TEACHING STRATEGIES

Then have students make a food cycle of the story, starting with them and working back to the clover. Join the ends with a decomposer, and add a decomposer between the hawk's droppings and the grass. (It will probably be too difficult for students to include the air in their cycle.)


decomposer
me
(hair)
cow
grass
decomposer
hawk
(droppings)
snake
frog
grasshopper
clover

Summarize the activity by asking:

WHAT IS A CYCLE?

WHAT LIVING THINGS HELP MAKE CYCLES OUT OF FOOD CHAINS?

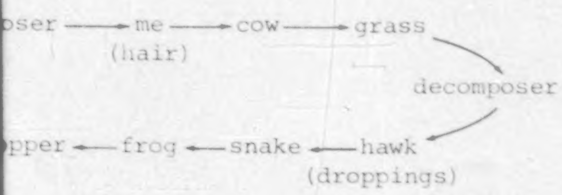
WHAT DO DECOMPOSERS DO THAT MAKES THEM SO IMPORTANT IN CYCLES?

CHANGE OF

See Change of Pacers 21 and 22.

TEACHING STRATEGIES

nts make a food cycle of the story, hem and working back to the clover. ith a decomposer, and add a decomposer k's droppings and the grass. (It will difficult for students to include the cle.)



ctivity by asking:

CYCLE?

G THINGS HELP MAKE CYCLES OUT OF S?

COMPOSERS DO THAT MAKES THEM SO IN CYCLES?

CHANGE OF PACER

cers 21 and 22.

ANTICIPATED STUDENT BEHAVIORS

Students should:

--respond, "Something that goes in circles."

--respond, "Decomposers."

--recall previous work and respond, "Break things down," "Make things rot," "Put stuff back in the soil."

Upon completion of this activity, each student should, as a minimum:

--be able to construct a simple food cycle by including a decomposer
--be able to explain how a decomposer can make a food chain into a food cycle.

ACTIVITY 4-18

Activity name suggested by class: Teacher ____________________

BSCS USE: Post___ Tally___ Rev___

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s)______________ Comment:

Specific Questions:

12. Could students realize what happened to decomposed things? ☐ No ☐ Yes
Comment:

13. Did any students have difficulty understanding Slide 4-27? ☐ No ☐ Yes
Explain:

BSCS Evaluation:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

11. Your rating of this activity:

☐ Worthwhile --keep as is
☐ Of value--needs the revision suggested
☐ Worth salvaging--make major changes described
☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s)______________ Comment:

Specific Questions:

12. Could students realize what happened to decomposed things? ☐ No ☐ Yes
Comment:

13. Did any students have difficulty understanding Slide 4-27? ☐ No ☐ Yes
Explain:

14. Did any students recall that decayed material is beneficial to the soil?
☐ No ☐ Yes Who?__________ How did they express this understanding?

BSCS Evaluation: EMH Feedback Form 1d

Teacher ______________________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff (we will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

BSCS Evaluation: EMH Feedback Form 1d

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

2. Develop an understanding of cycling and appreciate the cycling relationship of materials and organisms in the environment.

3. Recognize the role of decomposers in the cycling process.

Core B Objectives for the Student:

3. Appreciate how knowledge of decomposers can improve man's environment.

4. Conclude that microbes contribute to man's well-being as well as pose problems for man.

ENVIRONMENTAL THEME:

Interrelationships of Environmental Components, Cyclic Nature of Processes

INQUIRY SKILLS:

Identifying, Applying

PROBLEM-SOLVING SKILLS:

Discussion and Treatment of Group Data, Explaining

PRACTICAL APPLICATION:

Following Instructions, Recalling

CTIVITY

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Develop an understanding of cycling and appreciate the cycling relationship of materials and organisms in the environment.

Recognize the role of decomposers in the cycling process.

Objectives for the Student:

Appreciate how knowledge of decomposers can improve man's environment.

Conclude that microbes contribute to man's well-being as well as pose problems for man.

L THEME:
lationships of Environmental Components,
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ing

PLICATION:
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BSCS

UNIT IV. TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT

CORE B. DECOMPOSERS IN MY ENVIRONMENT

ACTIVITY 4-19. CLUES TO SUCCESS

MATERIALS

Worksheet 4-7
Slides 4-28 through 4-31
*35 mm Slide projector

Worksheet 4-7

*Not furnished in materials kit

TEACHING STRATEGIES

Activity 4-19. Clues to Success

This clue to success pertains to cycling and microbial activity. Use the questions to assess the success of your students since the last review.

Before beginning this activity, turn to the Progress in Following Directions page of the Student Record of Progress. Use the guidelines to rate your students on their ability to follow directions.

Distribute Worksheet 4-7.

Then say:

> WE ARE GOING TO HAVE ANOTHER CHANCE TODAY TO PRACTICE FOLLOWING DIRECTIONS. LISTEN CAREFULLY. I WILL REPEAT EACH DIRECTION ONLY ONE TIME.
>
> WRITE YOUR LAST NAME AND THEN YOUR FIRST NAME IN THE UPPER RIGHT-HAND CORNER OF THE WORKSHEET.
>
> NOW, PRINT THE DATE UNDER YOUR NAME JUST AS I PRINT IT ON THE CHALKBOARD.
>
> PUT AN X AT THE CENTER OF THE BOTTOM OF THE PAGE.
>
> NOW WE ARE GOING TO ANSWER SOME QUESTIONS ABOUT CYCLES AND MICROBES.

Project each question separately. Read the first questio and choices aloud to the students. Allow ample time for them to mark their worksheets. Repeat each question and choices. Follow the same procedure for the next three questions.

After all students have had the opportunity to answer all of the questions, collect the worksheets. Again project

TEACHING STRATEGIES

19. Clues to Success

success pertains to cycling and microbial
Use the questions to assess the success of
ts since the last review.

nning this activity, turn to the Progress in
irections page of the Student Record of
Use the guidelines to rate your students
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Worksheet 4-7.

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CE FOLLOWING DIRECTIONS. LISTEN
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NE TIME.

YOUR LAST NAME AND THEN YOUR FIRST
THE UPPER RIGHT-HAND CORNER OF THE
EET.

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aloud to the students. Allow ample time for
their worksheets. Repeat each question
Follow the same procedure for the next
ons.

udents have had the opportunity to answer all
ions, collect the worksheets. Again project

ANTICIPATED STUDENT BEHAVIORS

During this activity, each student should:

--answer the four questions on the worksheet
--participate in group discussion of answers on the worksheet.

MATERIALS

Slide 4-28, Question 1

Slide 4-29, Question 2

Slide 4-30, Question 3

Slide 4-31, Question 4

TEACHING STRATEGIES

each slide and discuss the answers with them. Encourage them to defend their choices. After class, tally the students' answers on Tallysheet 4-6. Consider whether the whole class needs further review, or if a few individuals need special attention, and make adjustments accordingly.

Then proceed to the next core.

Interpreting and Scoring

Item 1 tests the student's understanding of the word cycle by his choice of C circled on the worksheet.

Items 2 and 3 assess the concept that microbes are living. The student should answer correctly both items.

Item 4 emphasizes the concept that some microbes are helpful and necessary. The baked bread experiment is used as a practical application of this concept.

Review previous activities as necessary to help each student understand these concepts.

Using the Tallysheet:

Turn to the Concepts page of the Student Record of Progress and find the column marked "Activity 4-19, Cycle." Circle YES if the student marked the correct choice to question one on the worksheet. Otherwise, circle NO.

Find the column marked "Activity 4-19, Living Microbes." Circle YES if the student answered both questions two and three correctly. Otherwise, circle NO.

Find the column marked "Activity 4-19, Helpful Microbes." Circle YES if the student marked the correct choice. Otherwise, circle NO.

TEACHING STRATEGIES

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coring

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ss the concept that microbes are nt should answer correctly both

the concept that some microbes are ary. The baked bread experiment ical application of this concept.

tivities as necessary to help each these concepts.

et:

ts page of the Student Record of the column marked "Activity 4-19, S if the student marked the correct one on the worksheet. Otherwise,

rked "Activity 4-19, Living Microbes." student answered both questions two . Otherwise, circle NO.

rked "Activity 4-19, Helpful Microbes." student marked the correct choice. NO.

ANTICIPATED STUDENT BEHAVIORS

ACTIVITY
4-19

MATERIALS

TEACHING STRATEGIES

Turn to the Progress in Following Directions page of the Student Record of Progress. Three directions were given to students: 1) to write their last name first in upper right-hand corner, 2) to print the date exactly as shown on the board, 3) to mark an X at bottom center of the worksheet. Circle YES if all three directions were correctly followed. Circle NO if none of the three directions were followed. Circle PART for the remaining students to indicate partial ability to follow directions.

Turn to the Responsibility and Involvement page of the Student Record of Progress. Using the guidelines, rate each student's involvement in science.

TEACHING STRATEGIES

Progress in Following Directions page of Record of Progress. Three directions were dents: 1) to write their last name first nt-hand corner, 2) to print the date exactly the board, 3) to mark an X at bottom center heet. Circle YES if all three directions ly followed. Circle NO if none of the ions were followed. Circle PART for the udents to indicate partial ability to follow

Responsibility and Involvement page of the rd of Progress. Using the guidelines, rate 's involvement in science.

ANTICIPATED STUDENT BEHAVIORS

Upon completion of this activity, each student should, as a minimum:

--have answered the four questions on Worksheet 4-7
--have participated in a discussion of the worksheet

ACTIVITY 4-19

Activity name suggested by class: Teacher ____________________

BSCS USE: Post___ Tally___ Rev___

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1. Date taught (month and date, e.g. 11/2)						
2. Minutes of class time on science each day						
3. Minutes preparing for each day's science class						
4. Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s)____________ Comment:

Specific Questions:

12. Did any students defend their answers? ☐ No ☐ Yes Who?________ What were their arguments?

13. Were any questions on Worksheet 4-7 unsatisfactory? ☐ No ☐ Yes
Which ones?__________ Explain:

14. What added questions would you suggest for this

BSCS Evaluation:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

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☐ Worthwhile --keep as is
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If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s)______________ Comment:

Specific Questions:

12. Did any students defend their answers? ☐ No ☐ Yes Who?_________ What were their arguments?

13. Were any questions on Worksheet 4-7 unsatisfactory? ☐ No ☐ Yes Which ones?_____________ Explain:

14. What added questions would you suggest for this assessment?

15. Please send in Tallysheet 4-5 and Worksheet 4-7.

Teacher ____________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

BSCS Evaluation:

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff (we will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

BSCS Evaluation: EMH Feedback Form 1d

1. Was the background information for this core clear and useful? ☐ Yes ☐ No
Comment:

2. Was there too much preparatory reading and too many directions given to the teacher? ☐ Yes ☐ No
Comment:

3. Was it clear to you why these particular activities were chosen and the direction they were leading? ☐ Yes ☐ No

4. How would you increase the clarity of this core for students? (Help them understand why they are doing these activities.)

5. Is there a practical (take-home) value for your students in these activities?
☐ Yes ☐ No If yes, what do you see as the "take-home" lesson? If no, what is needed?

6. In these materials, what things did your students find difficult to do?

7. Comment about the amount of reading and writing required of students. Should there be more or less in this core?

8. Were the Clues to Success and Student Record of Progress helpful in this core?
☐ Yes ☐ No If helpful, how are they helpful?

9. Did you make use of the Planning Guide included in the introductory material for this core? ☐ Yes ☐ No
Comment:

10. During this core was class time taken for students to observe the pond, pets, or plants; play games from earlier activities, or explore science ideas not in the materials? ☐ Yes ☐ No
Comment:

11. If you could teach your way, rather than following the Guide, how would you do it?

12. Did the activities fulfill the purposes described by the core objectives and rationale? ☐ Yes ☐ No
Comment:

BSCS Evaluation: EMH Feedback Form

7. Comment about the amount of reading and writing required of students. Should there be more or less in this core?

8. Were the Clues to Success and Student Record of Progress helpful in this core?
☐ Yes ☐ No If helpful, how are they helpful?

9. Did you make use of the Planning Guide included in the introductory material for this core? ☐ Yes ☐ No
Comment:

10. During this core was class time taken for students to observe the pond, pets, or plants; play games from earlier activities, or explore science ideas not in the materials? ☐ Yes ☐ No
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11. If you could teach your way, rather than following the Guide, how would you do it?

12. Did the activities fulfill the purposes described by the core objectives and rationale? ☐ Yes ☐ No
Comment:

13. Which of your students do you believe were unsuccessful in achieving the objectives of this core of activities? Explain:

NEW STUDENTS ENTERING DURING THIS CO

Date Entered	Last Name	Name Used	Ethnic Group	Sex	Birthdate	Test Date	Tes
			W B S O	M F			W B
			W B S O	M F			W B
			W B S O	M F			W B
			W B S O	M F			W B
			W B S O	M F			W B
			W B S O	M F			W B

W = white
B = black
S = Spanish-
American
O = other

W=WIS
B=Bin
O=Oth
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STUDENTS DROPPED IN THIS PERIOD

Date Dropped	Last Name	First	Reason for Dropping

NEW STUDENTS ENTERING DURING THIS CORE

Group	Sex	Birthdate	Test Date	Test	Total	Verbal	Performance	Previous Test Score
S O	M F			W B O				
S O	M			W B O				
S O	M F			W B O				
S O	M F			W B O				
S O	M F			W B O				
S O	M F			W B O				

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ck
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W=WISC
B=Binet
O=Other
(Name)

ason for Dropping

Me and my Environment

UNIT IV. TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT

CORE C. GARBAGE AND MY ENVIRONMENT

AIMS FOR ME AND MY ENVIRONMENT

1. DEVELOPMENT IN EACH CHILD OF A SENSE OF IDENTITY AS A PERSON WHO HAS SOME DEGREE OF CONTROL OVER AND CAN ACT ON HIS ENVIRONMENT. This will lead to a degree of self-determination based on a rational coping with situations rather than on a passive compliance or an impulsive response to problems.
2. DEVELOPMENT IN EACH CHILD OF A SUCCESS SYNDROME. More than anything else, each activity is intended to be a success experience for each child. It is the teacher's responsibility -- almost obligation -- to see that each child succeeds at a level that is challenging to his abilities and that preserves his self-respect. It is a further responsibility of the teacher to point out his achievement. The students as a group should help each individual fit what he has done into a pattern of accomplishment.
3. DEVELOPMENT IN EACH CHILD OF AN INTEREST THAT COULD BECOME A HOBBY OR AVOCATION OVER A LIFETIME (through an exposure to an array of experiences in science). It is hoped that many children will find some area -- perhaps growing plants, caring for animals, identifying flowers, collecting things, or simply enjoying outings into the country -- that they feel strongly about and can develop some competence or knowledge in. This would provide a means of self-expression, and (perhaps) allow some degree of sharing or involvement with others.
4. DEVELOPMENT IN EACH CHILD OF A SENSE OF RELATIONSHIP AND EMPATHY WITH OTHER LIVING THINGS. It is hoped that this will lead to a positive regard and caring about what affects them as individuals and as a group, because what affects them affects the community of man.
5. DEVELOPMENT IN EACH CHILD OF AN UNDERSTANDING OF ENVIRONMENTAL CONDITIONS that will lead to a sense of responsibility for the environment and actions that protect or improve it.

1. Develop an understanding of the
2. Develop an understanding of cyc
relationship of the materials a
3. Recognize the role of decompose
4. Realize that because certain ma
to which man uses these materia
5. Comprehend the role of man as a
nature.

1. Perceive that garbage (solid wa
2. Recognize the composition of da
3. Recognize the need to recycle m
4. Identify ways to recycle materi
5. Realize the positive role micro

UNIT IV. TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT

CORE C. GARBAGE AND MY ENVIRONMENT

BSCS

UNIT IV GOALS

1. Develop an understanding of the flow of energy through the living world.
2. Develop an understanding of cycling and appreciate the cycling relationship of the materials and organisms in the environment.
3. Recognize the role of decomposers in the cycling process.
4. Realize that because certain materials are in finite supply, the extent to which man uses these materials will have an impact on the environment.
5. Comprehend the role of man as an integral part of nature not apart from nature.

CORE C OBJECTIVES

1. Perceive that garbage (solid waste) presents a difficult man-made problem.
2. Recognize the composition of daily garbage.
3. Recognize the need to recycle materials.
4. Identify ways to recycle materials.
5. Realize the positive role microbes play in the decomposition process.

CORE C RATIONALE

Attention is now focused on what the layman often considers to be the end of energy and material chains -- garbage. In a practical and short-term sense, this is true. To perceive the problem created by man's use and disposal of materials, as well as to realize the necessity for quickly returning the materials to natural or man-made cycles, a study of garbage is important and necessary.

Once there is an acknowledgement that a problem exists, a solution or accommodation to it can be tackled. Awareness, in itself, is a significant goal. It is in this final core of the unit that the student can be given the background and practical knowledge to exert some control over his immediate environment and to modify his behavior to alleviate rather than aggravate the problem. It is here, then, that the concepts of biodegradable, recycling, and composting can be used as a potential basis to make the students aware of their responsibilities in this direction.

BAC

The film *Garb*
ESSENTIAL THAT THI
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Activities 4-
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Activity 4-23
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Activity 4-24
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Groundwork fo
Activity 4-25, is
during the game wi
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UNIT IV. TRANSFER AND CYCLING OF
MATERIALS IN MY ENVIRONMENT

CORE C. GARBAGE AND MY ENVIRONMENT

BSCS

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BACKGROUND INFORMATION FOR THE TEACHER

The film *Garbage* serves as the basis for Activity 4-20. IT IS ESSENTIAL THAT THIS FILM BE ORDERED WELL IN ADVANCE AND THAT IT BE USED IN THE PROPER SEQUENCE OF ACTIVITIES. If a later trip to the local dump is out of the question, it is doubly important that you show this film or a suitable substitute. The film is designed to have visual impact presenting the problem of trash with a depth seldom thought of.

Activities 4-21 and 4-22 involve weighing and categorizing classroom trash. (Garbage and trash are essentially the same. Garbage generally includes organic matter, i.e., food scraps.) Hopefully this data will suggest the quantities produced by the entire school or by many households. In making this point you should know the population of your school and city. If students separate trash into categories, they will probably find that paper is the largest single component whether it was collected at school or at home. Inquiry should be directed towards recycling some of these materials.

Activity 4-23 is considered an optional activity because it is recognized that school policies may prevent this activity from being carried out. If a trip to the local dump or sanitary landfill can be made, however, the results should indicate that the time was well spent.

Activity 4-24 provides the opportunity for recycling in the more traditional and concrete sense. Spend time on this activity, maintaining enthusiasm during the extended time required, since this is a very practical way for the student to become involved and to demonstrate his understanding.

Groundwork for recycling has been laid. The Recycling Payoff Game, Activity 4-25, is purposely designed so that the person who recycles during the game wins. However true this may be someday in the real sense, fortunately we have not yet reached the crisis state of affairs where there is no alternative but to recycle at any cost.

BACKGROUND IN

Activity 4-26 is si
opportunity for recyclin
the recreational aspects

A final review of s
tional assessment prior

BACKGROUND INFORMATION FOR THE TEACHER (continued)

Activity 4-26 is similar to Activity 4-24 in that it provides the opportunity for recycling in the more traditional sense. It demonstrates the recreational aspects of recycling.

A final review of success, Activity 4-27, can serve as an instructional assessment prior to the start of the next unit.

Me and my Environment

UNIT IV.
CORE C.

PLANNING GUIDE

NOTE: Some activities (*indicated in italics and an* ⬉ *i*
be prepared several days or weeks in advance. Us
a teaching and preparation schedule. All supplie

Activity Number, Page, Tentative Teaching Time	Check List of Supplies Needed		
	Materials You Furnish	Materials in Supply Kit	(*Ital*
4-20. Garbage Days needed: 1-2	16 mm Film projector Screen Film: *Garbage* Media Department Holt, Rinehart and Winston, Inc. 383 Madison Avenue New York, New York 10017		*Order thi* *months in* *time. It* *$135.00.* *sanitatio* *Contact t* *out the a* *in garbag*
4-21. Classroom Trash Days needed: 2	String Plastic bags (garbage or can liner) Masking tape	Spring balance	One ball Five bags One per c *Begin col* *the activ* *disposal*
4-22. Garbage Probe Days needed: 1	35 mm Slide projector	Slide 4-32 Slide 4-33 Slide 4-34	Overturne Close-up Sorted tr

PLANNING GUIDE

e activities (*indicated in italics and an* ➤ *in the margin*) must
prepared several days or weeks in advance. Use this summary as
eaching and preparation schedule. All supplies needed are listed.

BSCS

t of Supplies Needed		Notes and Suggestions to Teacher
h	Materials in Supply Kit	(*Italics and Arrow Indicate Advance Preparation Directions*)
017		*Order this film, produced by King Screen Productions, several months in advance to guarantee you have it at the appropriate time. It can be rented for about $15.00 or purchased for $135.00. Numerous other film libraries and the local sanitation department may also have the film.* *Contact the local sanitation or public works department to find out the amount of money spent and the number of people employed in garbage collection.*
r	Spring balance	One ball strong enough to suspend a 25-pound weight Five bags per class One per class *Begin collecting trash at least five days prior to teaching the activity. Contact custodian and arrange visit to school disposal facilities.*
	Slide 4-32 Slide 4-33 Slide 4-34	Overturned trash can Close-up of trash Sorted trash

Me and my Environment

UNIT IV.
CORE C.

PLANNING GUIDE

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be prepared several days or weeks in advance. Use this
a teaching and preparation schedule. All supplies need

Activity Number, Page, Tentative Teaching Time	Check List of Supplies Needed		
	Materials You Furnish	Materials in Supply Kit	(*Italics a*
4-23. It's a Real Dump (Optional Activity) Days needed: 2			*This trip shoul* *the Teacher Pre* *in planning the* *outlined at lea*
4-24. Every Litter Bit Helps Days needed: 1	Teacher power--Student power		Make any commun outlined.
4-25. The Recycling Payoff Days needed: 3		Recycling Payoff Game Worksheet 4-8	One game set pe Used by student
4-26. Me, Recycling, and Art Days needed: 2-3	Art Supplies Various bottles, cans, glass, egg cartons, etc.		Provide art sup can be recycled Collected by st
4-27. Clues to Success Days needed: 1-2	35 mm Slide projector Tape recorder Blank cassette	Worksheet 4-9	

PLANNING GUIDE

vities *(indicated in italics and an ⬋ in the margin)* must
ed several days or weeks in advance. Use this summary as
g and preparation schedule. All supplies needed are listed.

BSCS

upplies Needed	Notes and Suggestions to Teacher
Materials in Supply Kit	*(Italics and Arrow Indicate Advance Preparation Directions)*
	This trip should be scheduled if at all possible. Read carefully the Teacher Preparation section of this activity for details in planning the trip. Make the contacts and arrangements outlined at least one week in advance.
	Make any community contacts needed to expedite the activities outlined.
Recycling Payoff Game Worksheet 4-8	One game set per four or five students Used by student to record game activities
	Provide art supplies only at a minimum where no substitute can be recycled. Collected by students and teacher to use for recycled art
Worksheet 4-9	

Me and my Environment

UNIT IV.
CORE C.

PLANNING GUIDE

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a teaching and preparation schedule. All supplie

Activity Number, Page, Tentative Teaching Time	Check List of Supplies Needed		
	Materials You Furnish	Materials in Supply Kit	(*Ital*
4-27. Clues to Success (continued)		Slide 4-35 Slide 4-36 Slide 4-37 Slide 4-38 Worksheet 4-10	Question Question Question Question Fate of a
4-28. What Do You Think? Days needed: 2	35 mm Slide projector	Worksheet 4-11 Worksheet 4-12 Worksheet 4-13 Worksheet 4-14 Slide 4-39	Question

PLANNING GUIDE

me activities (*indicated in italics and an* ↙ *in the margin*) must prepared several days or weeks in advance. Use this summary as eaching and preparation schedule. All supplies needed are listed.

BSCS

st of Supplies Needed		Notes and Suggestions to Teacher (*Italics and Arrow Indicate Advance Preparation Directions*)
sh	Materials in Supply Kit	
	Slide 4-35	Question 1, Clues to Success
	Slide 4-36	Question 2, Clues to Success
	Slide 4-37	Question 3, Clues to Success
	Slide 4-38	Question 4, Clues to Success
	Worksheet 4-10	Fate of a Newspaper
	Worksheet 4-11	
	Worksheet 4-12	
	Worksheet 4-13	
	Worksheet 4-14	
	Slide 4-39	Question 1, What do you think?

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

2. Develop an understanding of cycling and appreciate the cycling relationship of the materials and organisms in the environment.

3. Recognize the role of decomposers in the cycling process.

4. Realize that because certain materials are in finite supply, the extent to which man uses these materials will have an impact on the environment.

5. Comprehend the role of man as an integral part of nature not apart from nature.

Core C Objectives for the Student:

1. Perceive that garbage (solid waste) presents a difficult man-made problem.

2. Recognize the composition of daily garbage.

3. Recognize the need to recycle materials.

5. Realize the positive role microbes play in the decomposition process.

ENVIRONMENTAL THEME:

Cyclic Nature of Processes, Finiteness of Resources

INQUIRY SKILLS:

Describing

IVITY

ls for the Student:

Develop an understanding of cycling and appreciate the cycling relationship of the materials and organisms in the environment.

Recognize the role of decomposers in the cycling process.

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BSCS

UNIT IV.	TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT
CORE C.	GARBAGE AND MY ENVIRONMENT
ACTIVITY 4-20.	GARBAGE

PROBLEM-SOLVING SKILLS:
Explaining, Defending, Answering Why Questions

PRACTICAL APPLICATION:
Understand Problems in Garbage Disposal, Be Aware of Job Opportunities in Garbage Disposal

Activity 4-20. Garbage

A film, Garbage, *follows the route trash takes when discarded. It is designed to instill in the viewer a feeling of being inundated in garbage.*

Teacher Preparation:

1. A visit to the city dump (Activity 4-23) may be impossible in some school districts because of transportation costs, time limitations, or general administrative restrictions. If this is the case you should make every effort to obtain the *Garbage* film and complete this activity. If *Garbage* is not available, *The Garbage Explosion* is an acceptable alternate, or you might be able to locate other appropriate films on the subject.

2. For the class discussion of this film it will be necessary to obtain information about the total amount of money spent by your local government each year on garbage collection and disposal. You will also need to know how many people are employed to carry out these operations. Contact the appropriate office of local government such as

*Film, *Garbage* (King Screen Production) or *The Garbage Explosion* (Encyclopaedia Britannica)
*16 mm Film projector
*Screen

*Not furnished in materials kit

ING SKILLS:
ing, Defending, Answering Why Questions

PLICATION:
and Problems in Garbage Disposal,
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designed to instill in the viewer a
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ney spent by your local government
garbage collection and disposal. You
ed to know how many people are employed
these operations. Contact the
office of local government such as

BSCS

During this activity, each student should:

--*view the film* Garbage
--*participate in a discussion of the film*
--*list scavengers that might be at the dump*
--*identify biodegradable and nonbiodegradable components of garbage.*

MATERIALS

TEACHING STRATEGIES

the Department of Public Works or the Sanitary Engineer.

To add visual impact to the following activities you should now show the 11-minute film *Garbage* to the class. It documents one of the routes trash can take when discarded and follows the context of this core very well. It can be purchased from Holt, Rinehart and Winston, Inc., Media Department, 383 Madison Avenue, New York, New York, 10017, for $135.00. It can be rented for about $15.00 from the producers or numerous film libraries. Films may also be obtained from the local sanitation department. Be sure to preview the film(s) you plan to use.

Begin the class period by saying:

> WE ARE GOING TO SEE A FILM THAT HAS NO WORDS. WATCH THE FILM AND TRY TO FIGURE OUT WHAT WORDS WOULD GO WITH THE PICTURES.

Do not give any explanation of what is happening. This will allow the students to give unbiased impressions once the projection is completed.

When the film is over, ask:

> WHAT IS THE FILM ABOUT?

> DO YOU THINK THE FILM IS WELL NAMED?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
partment of Public Works or the Sanitary er.	Students should:
al impact to the following activities you show the 11-minute film *Garbage* to the class. s one of the routes trash can take when nd follows the context of this core very an be purchased from Holt, Rinehart and c., Media Department, 383 Madison Avenue, ew York, 10017, for $135.00. It can be about $15.00 from the producers or numerous ies. Films may also be obtained from the ation department. Be sure to preview the plan to use.	
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GOING TO SEE A FILM THAT HAS NO WORDS. THE FILM AND TRY TO FIGURE OUT WHAT WOULD GO WITH THE PICTURES.	
any explanation of what is happening. This the students to give unbiased impressions ojection is completed.	
lm is over, ask:	
S THE FILM ABOUT?	--respond, "What happens to garbage," "How much garbage people have," "Garbage collection is a big business," "Garbage is handled by lots of people before it goes to the dump (landfill)," "There's more to garbage collecting than I thought there was," and so forth.
THINK THE FILM IS WELL NAMED?	--indicate that all it showed was garbage, so that's a good name for it.

MATERIALS

TEACHING STRATEGIES

GIVE SEVE
STUDENTS A C
TO RESPO

WHAT ARE SOME OF THE DIFFERENT JOBS PEOPLE HAVE IN WORKING WITH GARBAGE?

ASK F
OTHER IDE

List student responses on the chalkboard.

(Student's name), HOW MANY MEN DO YOU THINK OUR CITY HIRES TO HANDLE GARBAGE?

GIVE SEVE
STUDENTS A C
TO RESPO

Write the responses on the chalkboard. After many students have made guesses, say:

I CALLED THE (name of place called) AND FOUND THAT OUR CITY HAS (number) PEOPLE WORKING WITH GARBAGE.

HOW DO YOUR GUESSES COMPARE WITH THIS NUMBER?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
GIVE SEVERAL STUDENTS A CHANCE TO RESPOND	
E OF THE DIFFERENT JOBS PEOPLE HAVE ITH GARBAGE?	--respond, "Garbagemen," "Garbage truck driver," "Truck driver," "Truck unloader," "Caterpillar driver."
ASK FOR OTHER IDEAS	
onses on the chalkboard.	
ame), HOW MANY MEN DO YOU THINK OUR HANDLE GARBAGE?	--make a variety of guesses.
GIVE SEVERAL STUDENTS A CHANCE TO RESPOND	
s on the chalkboard. After many guesses, say:	
(name of place called) AND FOUND HAS (number) PEOPLE WORKING WITH	
UESSES COMPARE WITH THIS NUMBER?	--compare their guesses with the actual number of garbage workers.

MATERIALS

TEACHING STRATEGIES

(Student's name), HOW MUCH MONEY DO YOU THINK OUR CITY SPENDS EACH YEAR TO HANDLE GARBAGE?

Write these figures on the chalkboard and after many students have made guesses, say:

OUR CITY SPENDS (amount of money) EACH YEAR TO HANDLE THE GARBAGE.

HOW DOES THAT AMOUNT COMPARE TO OUR GUESSES?

Say to the class:

SOME CITIES IN THE UNITED STATES SPEND MORE EACH YEAR GETTING RID OF GARBAGE THAN THEY SPEND FOR BOTH FIRE AND POLICE PROTECTION. THE MONEY IS SPENT TO PAY ALL THE PEOPLE WHO PICK UP THE GARBAGE, DRIVE THE TRUCKS, WORK AT THE DUMP, AND ALSO TO PAY FOR EQUIPMENT, GASOLINE, AND FIXING THE EQUIPMENT. SOMETIMES THE DUMP MAY BE AS FAR AS FIFTY MILES FROM WHERE THE GARBAGE IS PICKED UP.

WHAT WAS THE MAN DRIVING THE TRACTOR WEARING ON HIS FACE?

> If the students did not notice the mask, tell them that he was wearing a mask and then ask:

WHY WAS HE WEARING A MASK?

WHY DO DUMPS STINK?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
ent's name), HOW MUCH MONEY DO YOU THINK ITY SPENDS EACH YEAR TO HANDLE GARBAGE?	--again make a variety of guesses.
e figures on the chalkboard and after many ave made guesses, say:	
ITY SPENDS (amount of money) EACH YEAR TO E THE GARBAGE.	
OES THAT AMOUNT COMPARE TO OUR GUESSES?	--compare their guesses to the actual figure.
class:	
CITIES IN THE UNITED STATES SPEND MORE YEAR GETTING RID OF GARBAGE THAN THEY FOR BOTH FIRE AND POLICE PROTECTION. ONEY IS SPENT TO PAY ALL THE PEOPLE WHO UP THE GARBAGE, DRIVE THE TRUCKS, WORK E DUMP, AND ALSO TO PAY FOR EQUIPMENT, INE, AND FIXING THE EQUIPMENT. SOMETIMES UMP MAY BE AS FAR AS FIFTY MILES FROM THE GARBAGE IS PICKED UP.	
WAS THE MAN DRIVING THE TRACTOR WEARING S FACE?	--respond, "Mask," "Don't know," "Can't remember."
If the students did not notice the mask, tell them that he was wearing a mask and then ask:	
AS HE WEARING A MASK?	--respond, "Dump stinks," "There are microbes in the air," "Keep microbes out of his mouth and nose."
DUMPS STINK?	--respond, "The garbage is rotting or decomposing."

MATERIALS	TEACHING STRATEGIES

WHAT IS A MICROBE?

ARE MICROBES THAT LIVE IN THE DUMP HARMFUL OR HELPFUL?

(Student's name), WHY DO YOU THINK THAT MICROBES IN THE DUMP ARE HARMFUL?

(Student's name), WHY DO YOU THINK THAT MICROBES IN THE DUMP ARE HELPFUL?

Encourage the students to defend their answers and discuss other points of view.

Then say:

BOTH HARMFUL AND HELPFUL MICROBES LIVE IN THE DUMP.

WHAT ELSE MIGHT YOU SEE EATING THE GARBAGE IN THE DUMP?

WHAT DO WE CALL ALL THESE ANIMALS?

> If the words scavenger and pest do not come up, remind the students of the slides on scavengers.

Then ask:

WHY ARE THESE ANIMALS SOMETIMES CALLED PESTS?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
CROBE?	--recall experiences in Core A of Unit II and Core B of Unit IV and give statements such as, "Living things we can't see," "Living things that decompose biodegradable substances," "We call some of them germs," "Things that rot garbage."
THAT LIVE IN THE DUMP HARMFUL	--respond, "Harmful," "Helpful," "Don't know."
ame), WHY DO YOU THINK THAT MICROBES ARE HARMFUL?	--respond, "They make you sick," "They're bad."
ame), WHY DO YOU THINK THAT MICROBES ARE HELPFUL?	--respond, "They help rot the garbage," "They break things up," "They decompose things."
dents to defend their answers and discuss iew.	
AND HELPFUL MICROBES LIVE IN THE	
GHT YOU SEE EATING THE GARBAGE IN	--respond, "Rats," "Mice," "Cockroaches."
ALL ALL THESE ANIMALS?	--respond, "Scavengers," "Pests," or possibly, "Decomposers."
words scavenger and pest do not , remind the students of the on scavengers.	
E ANIMALS SOMETIMES CALLED PESTS?	--respond, "Something we don't like," "Things that are harmful," "Animals that carry disease," "They bite," "They're dirty."

MATERIALS

TEACHING STRATEGIES

Ask students what pests they might expect to find around garbage and list them on the chalkboard. Point out that these pests might be present anywhere that there is garbage which would include the home, street, and so forth.

> IN WHAT WAY COULD THESE PESTS BE HELPFUL?

Then say:

> BECAUSE THESE PARTICULAR SCAVENGERS ARE GENERALLY CONSIDERED UNPLEASANT, MAN USUALLY TRIES TO GET RID OF THEM. HOW DO WE GET RID OF THESE PESTS?

Say:

> LET'S LOOK AT THE FILM AGAIN AND THIS TIME LOOK FOR TWO THINGS: FIRST, WATCH FOR WAYS TO GET RID OF PESTS, AND SECOND, LOOK FOR THE KINDS OF THINGS THAT GARBAGE IS MADE UP OF.

Show the film again.

Then ask:

> WHAT ARE SOME WAYS WE CAN GET RID OF GARBAGE PESTS?

A
OTH

> WHAT THINGS MADE UP THE GARBAGE IN THE FILM?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
s what pests they might expect to find around list them on the chalkboard. Point out that might be present anywhere that there is ch would include the home, street, and so	--suggest pests such as flies, cockroaches, rats, mice, ants, worms, and so forth.
T WAY COULD THESE PESTS BE HELPFUL?	--respond, "They could break things down," "Eat garbage," and so forth.
E THESE PARTICULAR SCAVENGERS ARE GENERALLY ERED UNPLEASANT, MAN USUALLY TRIES TO GET THEM. HOW DO WE GET RID OF THESE PESTS?	--respond, "Kill them," "Shoot them," "Spray them."
LOOK AT THE FILM AGAIN AND THIS TIME LOOK O THINGS: FIRST, WATCH FOR WAYS TO GET PESTS, AND SECOND, LOOK FOR THE KINDS NGS THAT GARBAGE IS MADE UP OF.	
lm again.	
RE SOME WAYS WE CAN GET RID OF GARBAGE	--respond, "Use cans for storage," "Tight fitting lids on cans," "Bury garbage," "Spray," "Keep garbage picked up."
HINGS MADE UP THE GARBAGE IN THE FILM?	--suggest such things as food, tires, refrigerators clothes, paper, and so forth.

ASK FOR OTHER IDEAS

MATERIALS	TEACHING STRATEGIES

WHICH THINGS THAT YOU SAW IN THE DUMP WILL ROT OR DECOMPOSE?

List on the chalkboard those things that will decompose easily.

WHAT IS THE WORD THAT MEANS DECOMPOSE?

On the chalkboard write "biodegradable" by the items listed.

Then ask:

WHICH THINGS DID YOU SEE IN THE FILM THAT WILL NOT DECOMPOSE?

Make a second list on the chalkboard.

WHO REMEMBERS THE WORD THAT MEANS THINGS DO NOT DECOMPOSE?

Write "nonbiodegradable" by the second list.

WHAT WILL HAPPEN TO THE THINGS THAT ARE NONBIODEGRADABLE?

WHICH THINGS SEEN IN THE FILM DO WE HAVE BURIED IN OUR COMPOST?

On the chalkboard, circle the words that are included in the class compost pile. Conclude the activity by saying:

EACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
THAT YOU SAW IN THE DUMP WILL ROT	--name those things that will rot, such as lettuce, cabbage, grass clippings, meat scraps, bones, hair, and so forth.
oard those things that will decompose	
ORD THAT MEANS DECOMPOSE?	--recall the word biodegradable.
write "biodegradable" by the items	
DID YOU SEE IN THE FILM THAT WILL ?	--list those things that will not rot such as metal, rubber, plastic, and so forth.
on the chalkboard.	
THE WORD THAT MEANS THINGS DO ?	--recall the word nonbiodegradable.
dable" by the second list.	
PEN TO THE THINGS THAT ARE BLE?	--respond, "Make a mess," "Stay there."
SEEN IN THE FILM DO WE HAVE BURIED T?	--list the items they have buried that are like those in the film.
circle the words that are included in pile. Conclude the activity by	

ACTIVITY
4-20

MATERIALS

TEACHING STRATEGIES

WHAT WOULD HAPPEN IF THE GARBAGE MEN WENT ON STRIKE?

WHAT COULD YOU DO IN YOUR HOME IF THERE WAS A STRIKE?

DO YOU THINK GARBAGE WORKERS ARE IMPORTANT TO US?

WHY?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
WOULD HAPPEN IF THE GARBAGE MEN WENT ON E?	--predict, "Garbage will pile up," "Be a mess," "Really get to stinking things up."
COULD YOU DO IN YOUR HOME IF THERE WAS IKE?	--reply, "Bury the stuff so it wouldn't stink up the place," "Make a compost," "Don't let it get thrown around."
U THINK GARBAGE WORKERS ARE IMPORTANT TO	--respond, "Yes."
	--give a variety of answers, such as, "Garbage is hard to get rid of," "Everything would get to stinking if they didn't pick it up."
	Upon completion of this activity, each student should, as a minimum:
	--have viewed the film Garbage *--have participated in a discussion of the film.*

ACTIVITY 4-20

Activity name suggested by class:

Teacher____________________

BSCS USE: Post___ Tally___ Rev___

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s)______________ Comment:

Specific Questions:

12. Was there any difficulty in obtaining the film? No Yes Did you use any other film in place of "Garbage"? No Yes Was it satisfactory and would you recommend the BSCS staff view it for possible use? ☐ No ☐ Yes
Specify title and source:

Describe the film:

BSCS Evaluation:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

11. Your rating of this activity:

☐ Worthwhile --keep as is

☐ Of value--needs the revision suggested

☐ Worth salvaging--make major changes described

☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s) ______________ Comment:

Specific Questions:

12. Was there any difficulty in obtaining the film? No Yes Did you use any other film in place of "Garbage"? No Yes Was it satisfactory and would you recommend the BSCS staff view it for possible use? ☐ No ☐ Yes

Specify title and source:

Describe the film:

13. How did the students react to seeing the film for a second time?

BSCS Evaluation: EMH Feedback Form 1d

Side A

Teacher ______________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

BSCS Evaluation: E

BSCS Evaluation: EMH Feedback Form 1d

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff (we will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

2. Develop an understanding of cycling and appreciate the cycling relationship of the materials and organisms in the environment.

5. Comprehend the role of man as an integral part of nature not apart from nature.

Core C Objectives for the Student:

1. Perceive that garbage (solid waste) presents a difficult man-made problem.

2. Recognize the composition of daily garbage.

ENVIRONMENTAL THEME:

Cyclic Nature of Processes

INQUIRY SKILLS:

Comparing

PROBLEM-SOLVING SKILLS:

Discussion and Treatment of Group Data, Comparing Results

PRACTICAL APPLICATION:

Practice Weighing Skills

CTIVITY

oals for the Student:

. Develop an understanding of cycling and appreciate the cycling relationship of the materials and organisms in the environment.

. Comprehend the role of man as an integral part of nature not apart from nature.

Objectives for the Student:

. Perceive that garbage (solid waste) presents a difficult man-made problem.

. Recognize the composition of daily garbage.

AL THEME:
Nature of Processes

LLS:
ing

VING SKILLS:
sion and Treatment of Group Data,
ing Results

PPLICATION:
e Weighing Skills

BSCS

UNIT IV.	TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT
CORE C.	GARBAGE AND MY ENVIRONMENT
ACTIVITY 4-21.	CLASSROOM TRASH

ACTIVITY
4-21

MATERIALS

Spring balance
*String
*Plastic bags, garbage can liners
*Masking tape

*Not furnished in materials kit

TEACHING STRATEGIES

Activity 4-21. Classroom Trash

Man is a garbage maker. The quantity and variety of material thrown away each day by the average person is rather impressive. This activity will give the student the opportunity to examine both the contents and volume of the garbage that accumulates as a result of everyday activities. From this background some of the impact that garbage has on man can be understood and appreciated.

Teacher Preparation:

At least five days prior to the beginning of this activity, begin collecting at the end of each day the trash that accumulates in the classroom wastebasket(s). If possible, solicit student help in the collecting. As trash is placed in plastic bags, have students notice what kinds of things were thrown away. Empty the wastebasket(s) into a plastic garbage bag, tie the bag with string, or a twister, and attach a masking tape label on which is written the date and day of the week. Set the bag aside with a note to the custodian that the bag is not to be disposed of. Students will undoubtedly question the reason for doing this. Maintain their interest by simply telling them the bags will be used in an activity the following week.

Contact the custodian and make arrangements to have students visit the school's trash disposal facilities later in this activity. Indicate to the custodian that you would like him to explain to your class the procedures followed in disposing of school trash and garbage and answer questions that students may have.

Begin the activity by directing the students' attention to the five bags of wastepaper collected during the previous week.

WHAT IS IN THESE BAGS?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
-21. Classroom Trash	*During this activity, each student should:*
arbage maker. The quantity and variety of hrown away each day by the average person is ressive. This activity will give the student unity to examine both the contents and volume bage that accumulates as a result of everyday . From this background some of the impact that s on man can be understood and appreciated.	*--assist in the collection of classroom trash during a period of one week* *--help to weigh the collected trash* *--relate the class's accumulation of trash to the total daily amount produced by the school.*
eparation:	Students should:
ive days prior to the beginning of this begin collecting at the end of each day the accumulates in the classroom wastebasket(s). e, solicit student help in the collecting. As laced in plastic bags, have students notice of things were thrown away. Empty the t(s) into a plastic garbage bag, tie the bag g, or a twister, and attach a masking tape hich is written the date and day of the week. g aside with a note to the custodian that the to be disposed of. Students will undoubtedly he reason for doing this. Maintain their y simply telling them the bags will be used in y the following week. e custodian and make arrangements to have isit the school's trash disposal facilities his activity. Indicate to the custodian that like him to explain to your class the pro- llowed in disposing of school trash and garbage questions that students may have. ctivity by directing the students' attention bags of wastepaper collected during the eek.	
IS IN THESE BAGS?	--respond, "Our waste paper," "The stuff we throw away," "Trash."

MATERIALS

TEACHING STRATEGIES

DO YOU THINK THIS IS A LOT OF TRASH FOR ONE WEEK FROM JUST ONE ROOM IN THE SCHOOL?

WHAT KINDS OF TRASH DO WE HAVE IN OUR CLASSROOM?

WHAT IS MOST OF THE TRASH MADE OF?

HOW MUCH DO YOU THINK ALL THIS TRASH WEIGHS?

Record the students' guesses on the chalkboard.

Then ask:

HOW COULD WE FIND OUT FOR SURE HOW MUCH IT WEIGHS?

Hold up the spring scale and say:

THIS IS ONE KIND OF SCALE USED TO WEIGH THINGS. TO WEIGH THINGS ON THE SCALE YOU HANG THE ITEM FROM THE HOOK ON THE BOTTOM AND SEE HOW FAR THE NEEDLE ON THE SCALE GOES DOWN.

DEMONSTRA

Demonstrate the use of the spring balance by weighing one of the bags of garbage. Loop the string that is tied to the bag of garbage around the hook on the spring balance. Make certain that the string is looped several times so that it will not break when the garbage is suspended. If the quantity of garbage is large, it would be best to divide it into two garbage bags.

TEACHING STRATEGIES

THIS IS A LOT OF TRASH FOR
M JUST ONE ROOM IN THE SCHOOL?

F TRASH DO WE HAVE IN OUR CLASSROOM?

OF THE TRASH MADE OF?

YOU THINK ALL THIS TRASH WEIGHS?

ts' guesses on the chalkboard.

FIND OUT FOR SURE HOW MUCH IT

g scale and say:

KIND OF SCALE USED TO WEIGH THINGS.
NGS ON THE SCALE YOU HANG THE ITEM
K ON THE BOTTOM AND SEE HOW FAR
N THE SCALE GOES DOWN.

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f garbage. Loop the string that is
f garbage around the hook on the
Make certain that the string is looped
that it will not break when the
ded. If the quantity of garbage is
best to divide it into two garbage

ANTICIPATED STUDENT BEHAVIORS

Students should:

--express their opinions on the amount of trash.

--respond, "Paper," "Pencils," "Bags," "Lunches," and so forth.

--probably respond, "Paper."

--respond with a variety of guesses.

--respond, "Weigh it," "Use a scale."

MATERIALS

TEACHING STRATEGIES

Say:

> LET'S HOOK THE GARBAGE BAGS ON THE SCALE AND WEIGH THEM.

Select two students to weigh each bag - one to hold the scale, the other to hook the bag to the scale. Have each pair come to the front of the room, weigh, and record the weight on the chalkboard.

When all the bags have been weighed and recorded, ask:

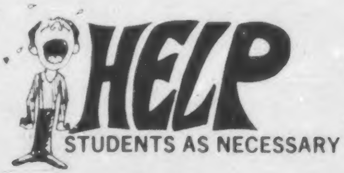
> HOW CAN WE FIND OUT HOW MUCH ALL THE BAGS WEIGH TOGETHER?
>
> WHO CAN ADD THESE NUMBERS TO GIVE US A TOTAL WEIGHT?

Select a volunteer to go to the chalkboard and do the arithmetic. Encourage other students to check his work. Compare the total weight to the list of guesses and praise the student with the closest guess.

Think of a teacher next door or across the hall that the students know and ask:

> DO YOU SUPPOSE (teacher's name)'S WASTEBASKET IS AS FULL AS OURS AT THE END OF THE DAY?

Continue by asking similar questions about other rooms in the school, such as the home economics room, shop, typing room, and so forth. Help students to realize that trash



TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
HOOK THE GARBAGE BAGS ON THE SCALE AND THEM.	
students to weigh each bag - one to hold the other to hook the bag to the scale. Have come to the front of the room, weigh, and weight on the chalkboard.	
he bags have been weighed and recorded, ask:	
AN WE FIND OUT HOW MUCH ALL THE BAGS TOGETHER?	--respond, "Add up the different bags," "Add the weights."
AN ADD THESE NUMBERS TO GIVE US A TOTAL T?	--raise hands.
olunteer to go to the chalkboard and do the . Encourage other students to check his pare the total weight to the list of guesses the student with the closest guess.	
teacher next door or across the hall that ts know and ask:	
U SUPPOSE (teacher's name)'S WASTEBASKET FULL AS OURS AT THE END OF THE DAY?	--suggest the amount of trash is about the same.
y asking similar questions about other rooms in , such as the home economics room, shop, typing so forth. Help students to realize that trash	

MATERIALS	TEACHING STRATEGIES
	accumulates to some degree in all rooms of the school as a result of normal daily activities. Be sure to include the lunch room in your questioning. Ask: IS THERE A LOT OF TRASH IN THE LUNCH ROOM AFTER LUNCH PERIOD? HOW OFTEN ARE THE TRASH BARRELS EMPTIED? WHO EMPTIES THEM? WHO EMPTIES THE WASTEBASKET IN OUR ROOM? Then ask: DO YOU SUPPOSE, THROUGHOUT THE WHOLE SCHOOL, THERE IS A LOT OF WASTE PAPER AND TRASH COLLECTED AT THE END OF EACH DAY? HOW MUCH? Don't solicit exact figures or become involved in determining exact amounts. The important thing is for the students to realize that a substantial volume of trash is produced as a result of the activities during a normal school day. Continue by asking: WHAT HAPPENS TO ALL THE TRASH AFTER IT IS COLLECTED BY THE CUSTODIAN(S)? WHERE DOES IT GO?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
me degree in all rooms of the school as l daily activities. Be sure to include your questioning.	
OT OF TRASH IN THE LUNCH ROOM AFTER ?	--respond, "Yes," "Yeah, lots."
E THE TRASH BARRELS EMPTIED?	--infer that the trash is emptied daily, or following each lunch period.
THEM?	--identify the custodian or helper responsible for emptying the barrels.
THE WASTEBASKET IN OUR ROOM?	--again identify the person(s) responsible.
SE, THROUGHOUT THE WHOLE SCHOOL, OT OF WASTE PAPER AND TRASH THE END OF EACH DAY?	--respond, "Yes."
	--infer that there would be a considerable amount.
ct figures or become involved in amounts. The important thing is to realize that a substantial volume ced as a result of the activities during ay.	
g:	
TO ALL THE TRASH AFTER IT IS THE CUSTODIAN(S)? WHERE DOES	--relate or speculate about the fate of the trash and respond, "A truck collects it," "I don't know."

ACTIVITY
4-21

MATERIALS

TEACHING STRATEGIES

WHO COULD TELL US WHAT HAPPENS TO IT?

> If the students are not acquainted with the custodian, say:
>
> LET'S FIND OUT FROM (custodian's name), THE SCHOOL CUSTODIAN.

Escort the students to the place in your school where the trash is disposed of. Invite the custodian into your classroom. Have the custodian explain the procedures he follows in getting rid of the trash and how much trash accumulates at the end of a day, after special activities such as ball games, after lockers are cleaned, and so forth.

Encourage the students to ask questions. Conclude the activity by asking:

WHAT HAPPENS TO THE TRASH AFTER IT LEAVES THE SCHOOL?

CHAN

See Change of Pacers 23, 24, 25, and 26.

TEACHING STRATEGIES

OULD TELL US WHAT HAPPENS TO IT?

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y asking:

HAPPENS TO THE TRASH AFTER IT LEAVES THE
L?

CHANGE OF PACER

of Pacers 23, 24, 25, and 26.

ANTICIPATED STUDENT BEHAVIORS

Students should:

--name or identify the school custodian.

--speculate about the next step in trash disposal procedures and respond, "It gets burned," "It goes to the dump," "They bury it."

Upon completion of this activity, each student should, as a minimum:

--have helped collect and weigh the class trash
--have observed and/or listened to an explanation of what happens to trash collected in the school.

ACTIVITY 4-21

Activity name suggested by class: Teacher ____________________

BSCS USE: Post___ Tally___ Rev___

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s)______________ Comment:

Specific Questions:

12. How did the students react to the volume of trash they determined was created in a school?

13. Did the bags of trash create interest in the activity? ☐ Yes ☐ No
Discuss:

BSCS Evaluation:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

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Discuss:

BSCS Evaluation: EMH Feedback Form 1d

Teacher ______________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

BSCS Evaluation: EMH Feedback Form 1d

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff (we will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

2. Develop an understanding of cycling and appreciate the cycling relationship of the materials and organisms in the environment.

5. Comprehend the role of man as an integral part of nature not apart from nature.

Core C Objectives for the Student:

1. Perceive that garbage (solid waste) presents a difficult man-made problem.

2. Recognize the composition of daily garbage.

ENVIRONMENTAL THEME:

Interrelationships of Environmental Components,
Cyclic Nature of Processes

INQUIRY SKILLS:

Associating (seeing relationships)

PROBLEM-SOLVING SKILLS:

Organizing Data

PRACTICAL APPLICATION:

Communication Skills

TIVITY

ls for the Student:

Develop an understanding of cycling and appreciate the cycling relationship of the materials and organisms in the environment.

Comprehend the role of man as an integral part of nature not apart from nature.

bjectives for the Student:

Perceive that garbage (solid waste) presents a difficult man-made problem.

Recognize the composition of daily garbage.

THEME:
lationships of Environmental Components,
ature of Processes

S:
ing (seeing relationships)

NG SKILLS:
ng Data

LICATION:
ation Skills

BSCS

UNIT IV. TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT

CORE C. GARBAGE AND MY ENVIRONMENT

ACTIVITY 4-22. GARBAGE PROBE

ACTIVITY
4-22

MATERIALS

Slides 4-32 through 4-34
*35 mm Slide projector
*Screen

TEACHING STRATEGIES

Activity 4-22. Garbage Probe

In the last activity the contents and quantity of school trash were examined. This activity extends that examination to solid wastes in the home, distinguishing between biodegradable and nonbiodegradable materials. From this background some of the impact that garbage has on man can be understood.

Begin the activity by saying:

> YESTERDAY WE TALKED ABOUT THE TRASH THAT IS THROWN AWAY IN OUR ROOM AND OTHER ROOMS IN THE SCHOOL. WHAT KINDS OF THINGS ARE IN OUR TRASH?
>
> WHAT KIND OF MATERIAL IS SCHOOL TRASH MOSTLY MADE OF?
>
> HOW DOES THE SCHOOL GET RID OF THIS TRASH?
>
> HOW DOES YOUR GARBAGE OR TRASH AT HOME DIFFER FROM THE STUFF THROWN AWAY HERE AT SCHOOL?

Now ask:

> HOW DOES YOUR FAMILY GET RID OF GARBAGE AT HOME?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
22. Garbage Probe *activity the contents and quantity of school* *xamined. This activity extends that* *to solid wastes in the home, distinguishing* *egradable and nonbiodegradable materials.* *ckground some of the impact that garbage has* *e understood.*	*During this activity, each student should:* *--view Slides 4-32 through 4-34* *--suggest categories that garbage could be sorted into* *--help group a garbage sample into various categories* *--trace the source of all the categories listed* *--recognize that some garbage materials break down and some do not* *--suggest materials in the garbage that could be reused.*
tivity by saying:	Students should:
DAY WE TALKED ABOUT THE TRASH THAT IS AWAY IN OUR ROOM AND OTHER ROOMS IN OOL. WHAT KINDS OF THINGS ARE IN SH?	--name such items as, "Paper," "Broken pencils," "Wood scraps," "Old notebooks," "Food," "Candy wrappers," "Sunflower seeds."
ND OF MATERIAL IS SCHOOL TRASH MOSTLY ?	--identify paper and paper products as the most common ingredient, although other materials may be mentioned.
S THE SCHOOL GET RID OF THIS TRASH?	--recall what was observed and said when talking with the school custodian.
S YOUR GARBAGE OR TRASH AT HOME DIFFER E STUFF THROWN AWAY HERE AT SCHOOL?	--describe items more commonly found at home such as bottles, cans, newspapers, magazines, broken toys, leftover food, clothing, and so forth.
S YOUR FAMILY GET RID OF GARBAGE AT	--respond, "Throw it in the garbage can," "Run it down the sink," "Burn it."

MATERIALS

TEACHING STRATEGIES

In order to begin making distinctions between the many components of home garbage ask:

HOW DOES YOUR FAMILY GET RID OF OLD PAPER?

WHAT DO YOU DO WITH CANS AND BOTTLES?

WHAT HAPPENS TO FOOD THAT IS LEFT OVER?

Then say:

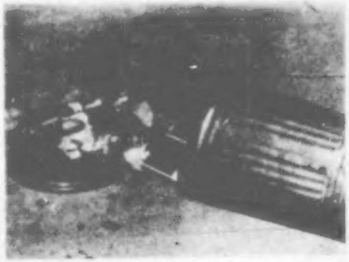
WE'VE BEEN TALKING ABOUT THE KINDS OF THINGS FOUND IN OUR GARBAGE AND WHAT HAPPENS TO THEM. LET'S LIST THE KINDS OF THINGS WE MIGHT FIND IN OUR GARBAGE.

Allow students to create their own categories for separating the garbage. List the categories on the chalkboard. The following categories will probably be suggested:

Plastic and rubber
Metal
Paper, wood, and cloth
Glass
Food (in plastic bags)
Other (questionable and rare products)

GIVE SEVER
STUDENTS A C
TO RESPON

Slide 4-32



Project Slide 4-32 and say:

TEACHING STRATEGIES

in making distinctions between the many
ome garbage ask:

OUR FAMILY GET RID OF OLD PAPER?

U DO WITH CANS AND BOTTLES?

NS TO FOOD THAT IS LEFT OVER?

TALKING ABOUT THE KINDS OF THINGS
UR GARBAGE AND WHAT HAPPENS TO THEM.
THE KINDS OF THINGS WE MIGHT FIND
BAGE.

to create their own categories for
garbage. List the categories on the
following categories will probably

rubber

, and cloth

astic bags)
tionable and rare products)

GIVE SEVERAL
STUDENTS A CHANCE
TO RESPOND

32 and say:

ANTICIPATED STUDENT BEHAVIORS

Students should:

--respond, "Throw it away," "Put it in the trash," "Save it for a paper drive."

--respond, "Throw them away," "Throw them in the garbage," "Take bottles back to the store."

--respond, "Throw it away," "Put it in the disposal," "Feed it to our dog."

ACTIVITY
4-22

MATERIALS

TEACHING STRATEGIES

HERE IS A TRASH CAN WITH GARBAGE THAT ONE FAMILY THREW AWAY IN ONE DAY.

WHAT IS IN THE GARBAGE?

Slide 4-33

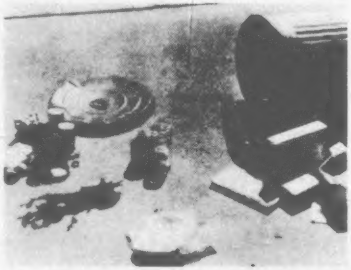
Project Slide 4-33 and say:

HERE IS A CLOSER LOOK AT WHAT IS IN THE TRASH CAN.

LET'S TRY TO SEPARATE THIS GARBAGE INTO GROUPS SIMILAR TO THE WAY WE'VE LISTED THEM ON THE CHALKBOARD.

On the chalkboard, make headings of "PAPER," "GLASS," "FOOD," "METAL," and any other groupings the class suggested. Have the students look at the slide picturing the garbage and list each item in the garbage pile under the proper heading.

Slide 4-34



When students have finished, project Slide 4-34, which pictures the garbage sorted into piles of paper, metal, glass, rubber and plastic, food, and other. Compare the way the class grouped the items in Slide 4-33 to the grouping on Slide 4-34. Discuss why each item was placed under the headings.

When the discussion of the grouping is complete, ask:

WHAT MATERIALS DO WE HAVE THE MOST OF IN OUR GARBAGE?

WHERE DO WE GET THIS MATERIAL FROM?

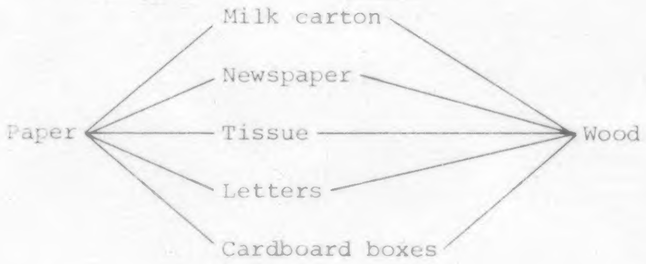
TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
S A TRASH CAN WITH GARBAGE THAT ONE THREW AWAY IN ONE DAY.	
S IN THE GARBAGE?	--describe the contents of the trash can mentioning such things as bottles, cans, paper, and so forth.
de 4-33 and say:	
S A CLOSER LOOK AT WHAT IS IN THE TRASH	
TRY TO SEPARATE THIS GARBAGE INTO SIMILAR TO THE WAY WE'VE LISTED N THE CHALKBOARD.	
kboard, make headings of "PAPER," "GLASS," TAL," and any other groupings the class Have the students look at the slide picturing and list each item in the garbage pile under heading.	
ts have finished, project Slide 4-34, which garbage sorted into piles of paper, metal, er and plastic, food, and other. Compare the ss grouped the items in Slide 4-33 to the Slide 4-34. Discuss why each item was the headings.	
cussion of the grouping is complete, ask:	
TERIALS DO WE HAVE THE MOST OF IN OUR ?	--examine the piles in the slide and identify the most common material in their garbage.
O WE GET THIS MATERIAL FROM?	--trace source of the most common category.

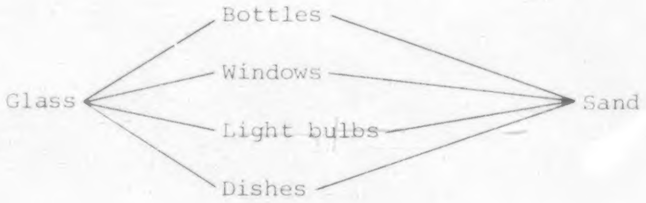
MATERIALS

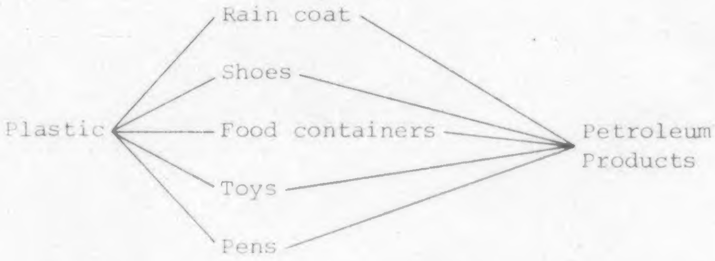
TEACHING STRATEGIES

As with the school trash, the most common category will probably be paper. The categories students are most likely not to know will be plastics (petroleum products) and glass (sand). Trace with your students the source of all the categories.

Examples:


Milk carton
Newspaper
Paper
Tissue
Wood
Letters
Cardboard boxes


Bottles
Windows
Glass
Sand
Light bulbs
Dishes


Rain coat
Shoes
Plastic
Food containers
Petroleum Products
Toys
Pens

TEACHING STRATEGIES

trash, the most common category will
. The categories students are most
will be plastics (petroleum products)
Trace with your students the source
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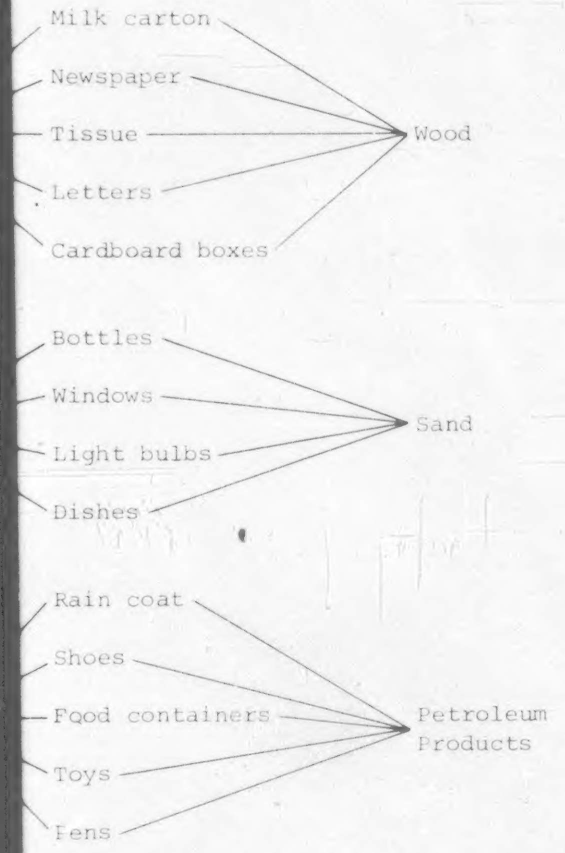
Milk carton
Newspaper
Tissue
Letters
Cardboard boxes
Wood
Bottles
Windows
Light bulbs
Dishes
Sand
Rain coat
Shoes
Food containers
Toys
Pens
Petroleum Products

ANTICIPATED STUDENT BEHAVIORS

ACTIVITY
4-22

MATERIALS

TEACHING STRATEGIES

Then say:

IF ALL PEOPLE IN THE UNITED STATES USE THIS MUCH (most common category - paper) IN A DAY, WHAT WILL HAPPEN EVENTUALLY?

IF WE KEEP USING THIS MUCH (paper) EVERY DAY, WHAT WILL HAPPEN TO OUR (paper) SUPPLY?

WHAT CAN WE DO SO THIS WILL NOT HAPPEN?

CAN ANY OF THESE THINGS (point to the list of categories) BE USED AGAIN?

WHICH ONES WOULD BE THE EASIEST TO USE AGAIN?

IF WE THROW OUR GARBAGE OUT, WHERE DOES IT GO?

Point to the list on the chalkboard.

WHAT WILL HAPPEN TO THESE MATERIALS IN THE DUMP?

WHAT THINGS DID NOT CHANGE VERY MUCH AT ALL IN OUR COMPOST PILE?

Point to the list on the chalkboard.

HOW ARE THESE MATERIALS LIKE THE ONES WE BURIED IN OUR COMPOST?

EVENTUALLY, WHAT WILL HAPPEN TO SOME OF THE MATERIALS IN THE DUMP?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
LL PEOPLE IN THE UNITED STATES USE THIS (most common category - paper) IN A DAY, WILL HAPPEN EVENTUALLY?	--respond, "Garbage will build up."
E KEEP USING THIS MUCH (paper) EVERY DAY, WILL HAPPEN TO OUR (paper) SUPPLY?	--infer that we will run out of that material.
CAN WE DO SO THIS WILL NOT HAPPEN?	--respond, "Use less," "Use it over again."
ANY OF THESE THINGS (point to the list of gories) BE USED AGAIN?	--respond, "Yes."
H ONES WOULD BE THE EASIEST TO USE AGAIN?	--identify things such as bottles, bags, and cans that can be used again.
E THROW OUR GARBAGE OUT, WHERE DOES IT GO?	--respond, "To the dump," "Garbage truck."
he list on the chalkboard.	
WILL HAPPEN TO THESE MATERIALS IN THE ?	--predict the fate of each material.
THINGS DID NOT CHANGE VERY MUCH AT ALL R COMPOST PILE?	--probably state that the piece of glass, metal bottle cap, and piece of plastic remained unchanged when compared with the rest of the materials.
he list on the chalkboard.	
RE THESE MATERIALS LIKE THE ONES WE D IN OUR COMPOST?	--identify similar materials.
UALLY, WHAT WILL HAPPEN TO SOME OF THE IALS IN THE DUMP?	--on the basis of their experience with the compost, predict that some will decompose and others will not.

MATERIALS

TEACHING STRATEGIES

GIVE SEVER
STUDENTS A C
TO RESPON

WHAT CAUSED SOME OF OUR COMPOST MATERIALS TO BREAK DOWN?

Then say:

CAN ANYONE REMEMBER WHAT WE CALL THINGS THAT ARE BROKEN DOWN BY DECOMPOSERS?

Write "biodegradable" on the chalkboard.

LET'S LIST SOME OTHER THINGS THAT ARE BROKEN DOWN BY DECOMPOSERS.

Write the term "nonbiodegradable" on the chalkboard.

Ask:

IF BIODEGRADABLE MEANS THINGS BROKEN DOWN BY DECOMPOSERS, WHAT DOES NONBIODEGRADABLE MEAN?

WHAT ARE SOME OTHER THINGS THAT ARE NOT BROKEN DOWN BY DECOMPOSERS?

SINCE SOME THINGS IN GARBAGE DO NOT DECOMPOSE VERY FAST, WHAT COULD BE DONE TO KEEP THEM OUT OF THE GARBAGE?

GIVE SEVERAL STUDENTS A CHANCE TO RESPOND

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
SOME OF OUR COMPOST MATERIALS TO	--recall that microbes, scavengers, and decomposers break down certain materials.
REMEMBER WHAT WE CALL THINGS THAT DOWN BY DECOMPOSERS? able" on the chalkboard.	--recall the term biodegradable.
SOME OTHER THINGS THAT ARE BROKEN OMPOSERS.	--suggest things such as paper, food wastes, leaves, grass, etc.
nonbiodegradable" on the chalkboard.	
DABLE MEANS THINGS BROKEN DOWN BY , WHAT DOES NONBIODEGRADABLE MEAN?	--recall the meaning of nonbiodegradable as things that are not broken down by decomposers.
ME OTHER THINGS THAT ARE NOT BY DECOMPOSERS?	--suggest such things as glass, pop cans, rubber tires, plastic cups, and so forth.
THINGS IN GARBAGE DO NOT DECOMPOSE WHAT COULD BE DONE TO KEEP THEM GARBAGE?	--suggest using only decomposable things or reusing things that are nondecomposable.

ACTIVITY
4-22

MATERIALS

TEACHING STRATEGIES

WHAT MATERIALS IN OUR GARBAGE COULD BE REUSED?

WHAT THINGS THAT DO DECOMPOSE COULD BE USED IN PLACE OF THINGS THAT ARE THROWN AWAY AND DO NOT DECOMPOSE?

The questions at the end of this activity are by no means exhaustive or complete. They are merely introductory to Activity 4-23, which will shed more light on the garbage problem.

TOMORROW WE WILL GO TO THE DUMP AND SEE IF WE MIGHT FIND ANSWERS TO SOME OF OUR QUESTIONS ABOUT GARBAGE.

See Change of Pacer 27.

GIV
STUDEN
TO

CHANG

TEACHING STRATEGIES

MATERIALS IN OUR GARBAGE COULD BE REUSED?

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FIND ANSWERS TO SOME OF OUR QUESTIONS
GARBAGE.

CHANGE OF PACER

of Pacer 27.

ANTICIPATED STUDENT BEHAVIORS

Students should:

--identify such things as plastic bags, bottles, etc.

--suggest the use of paper instead of plastics or glass.

Upon completion of this activity, each student should, as a minimum:

--have participated in the grouping of garbage into appropriate categories

--be able to describe some categories of materials found in garbage.

ACTIVITY 4-22

Activity name suggested by class:

Teacher ____________________

BSCS USE: Post___ Tally___ Rev___

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is
☐ Of value--needs the revision suggested
☐ Worth salvaging--make major changes described
☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s)____________ Comment:

Specific Questions:

12. Could students identify the source of the items?

13. Which students do not remember the terms "biodegradable" and "nonbiodegradable" from one day to the next?

BSCS Evaluation:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

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If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s)______________ Comment:

Specific Questions:

12. Could students identify the source of the items?

13. Which students do not remember the terms "biodegradable" and "nonbiodegradable" from one day to the next?

14. Which students can tell in their own words what "biodegradable" and "nonbiodegradable" mean?

BSCS Evaluation: EMH Feedback Form 1d

Side A

Teacher ______________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

BSCS Evaluation: EMH Feedback Form 1d

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff (we will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

2. Develop an understanding of cycling and appreciate the cycling relationship of the materials and organisms in the environment.

3. Recognize the role of decomposers in the cycling process.

4. Realize that because certain materials are in finite supply, the extent to which man uses these materials will have an impact on the environment.

5. Comprehend the role of man as an integral part of nature, not apart from nature.

Core C Objectives for the Student:

1. Perceive that garbage (solid waste) presents a difficult man-made problem.

2. Recognize the composition of daily garbage.

ENVIRONMENTAL THEME:

Cyclic Nature of Processes

INQUIRY SKILLS:

Observing, Identifying, Inferring

PROBLEM-SOLVING SKILLS:

Asking Questions

PRACTICAL APPLICATION:

Exposure to Vocational Opportunities in the Area of Solid Waste Disposal

ACTIVITY

Goals for the Student:

2. Develop an understanding of cycling and appreciate the cycling relationship of the materials and organisms in the environment.

3. Recognize the role of decomposers in the cycling process.

. Realize that because certain materials are in finite supply, the extent to which man uses these materials will have an impact on the environment.

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Objectives for the Student:

. Perceive that garbage (solid waste) presents a difficult man-made problem.

. Recognize the composition of daily garbage.

AL THEME:
Nature of Processes

LLS:
ing, Identifying, Inferring

VING SKILLS:
Questions

PPLICATION:
re to Vocational Opportunities in
ea of Solid Waste Disposal

BSCS

UNIT IV.	TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT
CORE C.	GARBAGE AND MY ENVIRONMENT
ACTIVITY 4-23.	IT'S A REAL DUMP

MATERIALS

TEACHING STRATEGIES

Activity 4-23. It's a Real Dump

In this activity students will visit their community's garbage dump, central trash collection site, incinerator, or school trash area. They will gain knowledge of how trash is disposed of in their immediate environment. The value of this experience is that the students are able to see the disposal of garbage firsthand so that they begin to understand the problems of disposing of nonbiodegradable materials.

Teacher Preparation:

Contact the manager of the city dump, incinerator, collection site, or school trash area or incinerator at least a week before the planned visit. You might wish to have him be present and explain the city operation of garbage disposal either in the classroom before or after the visit, or at the dump the day of the visit. Set a mutually satisfactory date and time for the visit, with an alternate date in case of inclement weather. Call again the day before the visit to confirm the arrangement. If your community has a landfill, the city administration may prefer to use the words "sanitary landfill" instead of "dump" to describe it.

While on the visit students should look for the following kinds of things.

1. The different kinds of garbage brought to the dump.
2. Is the garbage separated and dumped in different areas or not? Why?
3. Is any garbage burned?
4. Is all the garbage burned?

TEACHING STRATEGIES

23. It's a Real Dump

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ings.

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e garbage separated and dumped in different
or not? Why?

y garbage burned?

l the garbage burned?

ANTICIPATED STUDENT BEHAVIORS

During this activity, each student should:

--visit the community garbage dump
--participate in a discussion of the experience at the dump
--infer the impact of nonbiodegradable materials on the environment.

MATERIALS

TEACHING STRATEGIES

5. What jobs are necessary? What are the responsibilities of each of these jobs?

6. Where is the dump located in relationship to the community? Is it close to the city or far away from it? Why?

7. How many trucks bring garbage to the dump each day?

8. Are there any animals and insects living at the dump? What are they?

9. How does the dump look?

10. How does the dump smell? Why?

11. How is our dump like and unlike the one in the film?

12. How much land is a part of the dump?

13. How much land has already been covered or filled at the dump?

14. What land, if any, is available for new garbage dumps?

15. What is done with the garbage that will rot?

16. What is done with the garbage that will not rot?

17. What things did you see that could have been used again rather than thrown away?

18. Are any materials recycled? How?

Have the list of questions dittoed so that the students can refer to them while on the trip. You may wish to have teams assigned to certain questions or have a contest to see who can answer the most questions. A

TEACHING STRATEGIES

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lities of each of these jobs?

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ANTICIPATED STUDENT BEHAVIORS

ACTIVITY
4-23

MATERIALS

TEACHING STRATEGIES

tape recorder taken on the trip might be used to tape talks and the answers to questions.

The day after the students have been to the dump go over the list on the chalkboard, i.e., garbage jobs, etc., and discuss. Also discuss their experiences, bringing out the preceding suggested items, stressing that many items that are disposed of do not decompose.

CHAN

See Change of Pacers 28 and 29.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
der taken on the trip might be used to tape the answers to questions. ter the students have been to the dump go over n the chalkboard, i.e., garbage jobs, etc., s. Also discuss their experiences, bringing eceding suggested items, stressing that many are disposed of do not decompose.	Students should: --infer the impact of nonbiodegradable materials on the environment. *Upon completion of this activity, each student should, as a minimum:* *--visit the community garbage dump* *--have participated in a discussion of the experience at the dump.*

CHANGE OF PACER

of Pacers 28 and 29.

ACTIVITY 4-23

Activity name suggested by class:

Teacher____________________

BSCS USE: Post___ Tally___ Rev___

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s)____________ Comment:

Specific Questions:

12. Did you have difficulties in arranging the visit to the garbage dump?
☐ No ☐ Yes Explain:

13. What was the student reaction to visiting the dump?
efore they went?

BSCS Evaluation: E

BSCS Evaluation: EMH Feedback Form 1d

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

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12. Did you have difficulties in arranging the visit to the garbage dump?
☐ No ☐ Yes Explain:

13. What was the student reaction to visiting the dump?
Before they went?

After the trip?

Side A

Teacher ______________________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

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BSCS Evaluation: EMH Feedback Form 1d

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff (we will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

2. Develop an understanding of cycling and appreciate the cycling relationship of the materials and organisms in the environment.

4. Realize that because certain materials are in finite supply, the extent to which man uses these materials will have an impact on the environment.

5. Comprehend the role of man as an integral part of nature not apart from nature.

Core C Objectives for the Student:

3. Recognize the need to recycle materials.

4. Identify ways to recycle materials.

ENVIRONMENTAL THEME:

Cyclic Nature of Processes, Finiteness of Resources

INQUIRY SKILLS:

Applying

PROBLEM-SOLVING SKILLS:

Knowing Question and Task

PRACTICAL APPLICATION:

Develop Recycling Habits, Cleaning Up the Environment, Working in a Group

TIVITY

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Develop an understanding of cycling and appreciate the cycling relationship of the materials and organisms in the environment.

Realize that because certain materials are in finite supply, the extent to which man uses these materials will have an impact on the environment.

Comprehend the role of man as an integral part of nature not apart from nature.

Objectives for the Student:

Recognize the need to recycle materials.

Identify ways to recycle materials.

L THEME:

Nature of Processes, Finiteness of es

LS:

g

ING SKILLS:

Question and Task

PLICATION:

Recycling Habits, Cleaning Up the nent, Working in a Group

BSCS

UNIT IV. TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT

CORE C. GARBAGE AND MY ENVIRONMENT

ACTIVITY 4-24. EVERY LITTER BIT HELPS

MATERIALS

TEACHING STRATEGIES

Activity 4-24. Every Litter Bit Helps

Activities in this core stress the problem of solid waste disposal, and specifically the problems brought about by nonbiodegradable materials. It is both appropriate and desirable that the students participate in a cleanup and/or collection project whereby a selected category of waste material is collected for possible reuse. Hopefully, the students will receive a monetary reward for materials collected as an added incentive for reusing waste materials.

Teacher Preparation:

The interest of your students and your ability to stimulate this interest will, to a large extent, determine the success of whatever project is selected. In any area there should be a number of specific projects from which to choose. Some of these, such as collecting cans and bottles, can be used as money-making projects.

The project you select should be continued for some time, preferably for the remainder of the year. If it is a money-making project, students should be allowed to decide how the money will be used. One popular goal is a trip to a restaurant.

In Activity 4-26 the students will reuse selected waste materials in the construction of something useful or a work of art. In order to have sufficient materials available to carry out this activity, the collection of these materials should be begun at this time also. Refer to Activity 4-26 for suggested projects. You may wish to set aside a box or area in the room where the collected materials can be stored. Ask each person to bring at least one object between now and the beginning of Activity 4-26. You may find it helpful to begin collecting appropriate materials yourself so there will be a variety of things available at the proper time.

TEACHING STRATEGIES

-24. Every Litter Bit Helps

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least one object between now and the
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.

ANTICIPATED STUDENT BEHAVIORS

During this activity, each student should:

--*participate in a class or individual recycling project*
--*recognize the benefits to the environment as a result of cleaning up and/or reusing waste materials.*

MATERIALS

TEACHING STRATEGIES

You are the key factor in generating and keeping interest in the project, so be enthusiastic!

Following are suggested projects for this activity. Feel free to participate in any activities you may know of whether or not they are listed. Students may also have suggestions. You may find it expeditious to work in cooperation with any civic groups that already have initiated such projects. Groups that have been involved in the past are the YMCA, Kiwanis, Jaycee's, as well as local and school environmental groups. You may wish to contact one or more of these groups in advance for information and additional suggestions.

Suggested Projects:

1. *Collecting aluminum and steel cans
2. *Collecting glass bottles
3. *Collecting scrap metal
4. *Collecting newspapers
5. Cleaning up the school grounds
6. Cleaning up vacant yards
7. Cleaning public grounds and parks
8. Cleaning water shorelines
9. Keeping a stretch of roadway or hiking trails litter free through a periodic patrol

*These items can usually be returned for money.

Be creative and enthusiastic!

Keep a record of the amounts of things collected and continue to stress the benefits of such endeavors, especially since they directly influence the students' natural environment.

TEACHING STRATEGIES

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may find it expeditious to work in
any civic groups that already have
ojects. Groups that have been involved
he YMCA, Kiwanis, Jaycee's, as well as
environmental groups. You may wish to
re of these groups in advance for
dditional suggestions.

s:

aluminum and steel cans
glass bottles
scrap metal
newspapers
the school grounds
vacant yards
blic grounds and parks
ter shorelines
tretch of roadway or hiking trails
through a periodic patrol

usually be returned for money.

nthusiastic!

the amounts of things collected and
s the benefits of such endeavors,
they directly influence the students'
nt.

ANTICIPATED STUDENT BEHAVIORS

Upon completion of this activity, each student should, as a minimum:

--be able to state one or more ways he can personally help to improve his environment.

ACTIVITY 4-24

Activity name suggested by class:

Teacher____________________

BSCS USE: Post___ Tally___ Rev___

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s)____________ Comment:

Specific Questions:

12. Were any monetary rewards or recognition gained by the collecting activity?

13. How much interest was generated in the cleanup project? How many continued on their own in the cleanup campaign?

BSCS Evaluation:

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is
☐ Of value--needs the revision suggested
☐ Worth salvaging--make major changes described
☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s)______________ Comment:

Specific Questions:

12. Were any monetary rewards or recognition gained by the collecting activity?

13. How much interest was generated in the cleanup project? How many continued on their own in the cleanup campaign?

Teacher ______________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

BSCS Evaluation: EM

BSCS Evaluation: EMH Feedback Form 1d

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff (we will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

2. Develop an understanding of cycling and appreciate the cycling relationship of the materials and organisms in the environment.

4. Realize that because certain materials are in finite supply, the extent to which man uses these materials will have an impact on the environment.

5. Comprehend the role of man as an integral part of nature not apart from nature.

Core C Objectives for the Student:

3. Recognize the need to recycle materials.

ENVIRONMENTAL THEME:

Cyclic Nature of Processes, Finiteness of Resources

INQUIRY SKILLS:

Associating, Applying

PROBLEM-SOLVING SKILLS:

Knowing Question and Task, Explaining, Defending, Answering Why Questions

PRACTICAL APPLICATION:

Working in Groups, Following Directions

ACTIVITY

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ILLS:
iating, Applying

LVING SKILLS:
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ding, Answering Why Questions

APPLICATION:
ng in Groups, Following Directions

BSCS

UNIT IV. TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT

CORE C. GARBAGE AND MY ENVIRONMENT

ACTIVITY 4-25. THE RECYCLING PAYOFF

MATERIALS

TEACHING STRATEGIES

Activity 4-25. The Recycling Payoff

This activity emphasizes a rather difficult concept - recycling. To obtain a working definition of recycling and an appreciation of its good aspects are the main purposes of the activity. Other more subtle aspects of recycling may or may not be realized, depending on the readiness and background of your class. Increased understandings that could result from playing the game presented in this activity are as follows:

1. *An understanding and a working definition of recycling.*

2. *A realization that some things are in finite supply and that the supply can be exhausted, perhaps because of circumstances we cannot control.*

3. *An understanding of why recycling is frustrating: a) it may be the obvious thing to do, yet may not be possible at certain times and with certain things; b) it costs money and long-range benefits may not be obvious.*

4. *A realization that there is an element of chance in finding new resource supplies and, therefore, man must continually search for new resource locations. The possible resource sites are also finite and, therefore, recycling will ultimately be essential.*

5. *A realization that at times money, land, and other possessions are worthless if freedom is lost or if they cannot be used to secure desired ends.*

TEACHING STRATEGIES

-25. The Recycling Payoff

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st or if they cannot be used to secure
ed ends.

ANTICIPATED STUDENT BEHAVIORS

During this activity, each student should:

--participate in the Recycling Payoff Game
--develop an understanding of the rules of the game and use them in making wise choices in the game
--manage his "money" successfully and stay in the game as long as possible
--develop a working definition of recycling.

MATERIALS

Recycling Payoff Game (one game set per four students) with two rigs per player
Worksheet 4-8

TEACHING STRATEGIES

Teacher Preparation:

Prior to this activity select interested students to cut out and tape together the drilling rigs. Read the rules carefully prior to explaining them to the class so that you are familiar enough with the way the game is played to answer any questions that may arise.

The rules of the game are not as complex as they may first appear. To explain them to the class, it will be necessary to use a group of students as an exampl the first day it is played. Then the game should be played several times on Day 2 and Day 3. The game should also be played at times requested by the students and/or as seems appropriate to you.

Before the game is started, create interest by allowing students to drill just for fun on the game board. The game board has wooden blocks inside that should be placed in different locations each time the game is played. To accomplish this, the board should be shaken by the banker, placed in the middle of four players, and then not moved again until the game is over.

If students are worried by the concept of "drilling" for gold, etc., explain that these metals are mined, but in order to find out where to dig a mine, a drill may be used to find out what sort of rocks are under the ground.

Rules of the Recycling Payoff Game:

1. The game can be played by two, three, or four players and a banker.

2. At the start of the game each player receives $500.00 and two drilling rigs of the same color. A different color should be used for each player. (Once students are familiar with the rules, you may wish for variety to start with three rigs each, or to start with only $300.00 and one plot of land.)

TEACHING STRATEGIES

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ANTICIPATED STUDENT BEHAVIORS

MATERIALS

TEACHING STRATEGIES

3. Any method can be used to determine who goes first. After that, the player sequence is in a clockwise direction.

4. The banker handles all the money and makes sure players keep to the rules. (These can be written on the chalkboard if this will help.)

5. During the first round of play, each player will have to buy land; players cannot drill until they own land. Buying constitutes the first turn. A player must wait until at least his second turn to drill.

6. At any given turn after the first round, a player has three options - buy land, drill, or recycle - as outlined below.

   I. Buy Land

      A. Costs $200.00 per plot.

      B. Pay banker $200.00 and draw card from land card pile. The number on the card corresponds to the plot purchased by the player.

      C. Player keeps the land card in front of him until he drills that land, then turns the card over so it is no longer used.

   II. Drill

      A. A player can drill during his turn if he owns a piece of land to drill on and has an available drilling rig with which to drill. (When students are familiar with the game, they may wish to trade land cards before they drill.)

TEACHING STRATEGIES

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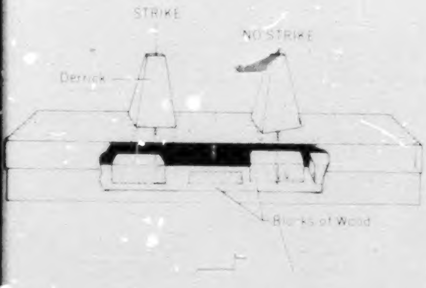
ANTICIPATED STUDENT BEHAVIORS

MATERIALS

Diagram 4-10



TEACHING STRATEGIES

B. Drill by placing the derrick over one of the sixty drilling holes on the game board and forcing the derrick stick into the hole. If the stick goes all the way down, a miss results; if it goes only partially down, a strike results.

C. After drilling, follow one of two possible courses of action.

1. If a strike occurs, (see Diagram 4-10), the player should DRAW A CARD from the strike pile and collect the payoff, as described on the card, from the banker. His turn is then over and the rig is left on the property until a later turn.

2. If the drilling was a miss (see Diagram 4-10) the player can either RECYCLE his rig or SELL his rig to the banker. If he recycles the rig:

> The player pays $100.00 to the banker, gets one piece of land, and a chance to drill again during this same turn. If a strike occurs on a recycling drill, the player can again collect by drawing a card from the strike card pile, but he may not drill again. After recycling once, the turn is over.

If the player elects to sell the drilling rig instead of recycle:

> He turns in his rig to the banker and receives $500.00. After selling, the turn is over.

TEACHING STRATEGIES

ANTICIPATED STUDENT BEHAVIORS

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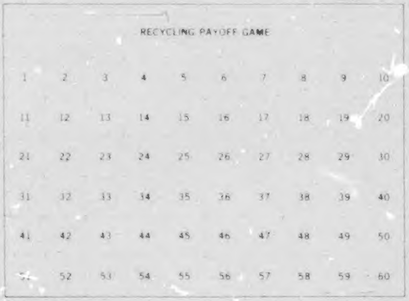
MATERIALS

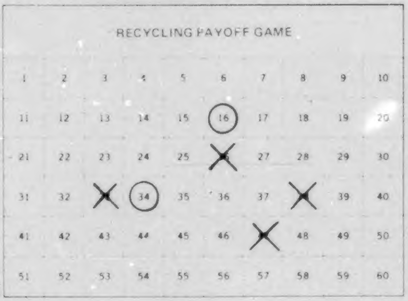
Worksheet 4-8



RECYCLING PAYOFF GAME

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60

Diagram 4-11



TEACHING STRATEGIES

Each group playing the game can use Worksheet 4-8 to keep track of strikes and misses. Place a circle on the land where a strike has been made and an X where there was a miss. (See Diagram 4-11.)

NOTE: There is no way to repurchase a rig in the game once it has been sold to the bank. This is the item in the game that is in finite supply. When you run out, either by choice or force, you can not buy a new one. Make this rule clear as early as possible.

III. Recycling

A. A player may use his turn for recycling if he has a rig out in the field that is tied up from a previous strike or miss. On a recycling turn, the player must pay $100.00 to recycle his rig. In addition he gets one piece of property that he can then drill on during that same turn. Once he has recycled during a turn, however, a player may not recycle again during the same turn! He must wait for another turn.

7. Playing the game continues until one out of three or two out of four players are out of the game. You are out of the game when you have no drilling rigs to drill with. This will happen when the player has been forced to sell his rigs in order to get money to stay in the game.

8. When two players are out of the game, the banker will pay the players still in the game $1000.00 for each of their remaining rigs and $100.00 for each piece of property not drilled on.

9. The winner will then be determined according to who has the most money.

TEACHING STRATEGIES

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ANTICIPATED STUDENT BEHAVIORS

MATERIALS

TEACHING STRATEGIES

By design, the person who has recycled rigs most often will be the winner. This may not be obvious to students at first, and it may take several playings to bring this out. They will soon catch on to what it takes to stay in the game (i.e., recycle every time you can), and this should be the time that you point out to the students the advantages of recycling materials. Stress the concept of recycling whenever possible while the students are playing the game. Bring in other examples of recycling whenever possible.

After playing the game several times, ask these questions:

WHAT IS THE BEST WAY TO PLAY IN ORDER TO WIN THIS GAME?

WHAT DOES RECYCLE MEAN IN THIS GAME?

WHAT IS RECYCLED IN OUR GAME?

WHY MIGHT PEOPLE RECYCLE OIL RIGS?

COULD WE RUN OUT OF METAL TO MAKE OIL RIGS?

DO WE HAVE ENDLESS AMOUNTS OF THE THINGS WE ARE DRILLING FOR IN OUR GAME?

WHAT WILL HAPPEN TO THE LAND IF WE GO ON PLAYING THE GAME FOR A LONG TIME?

WILL WE BE ABLE TO FIND THINGS BY DRILLING THEN?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
person who has recycled rigs most often ner. This may not be obvious to students t may take several playings to bring this soon catch on to what it takes to stay e., recycle every time you can), and this ime that you point out to the students the ecycling materials. Stress the concept of ver possible while the students are play- Bring in other examples of recycling le.	
he game several times, ask these	
E BEST WAY TO PLAY IN ORDER TO WIN THIS	--conclude that it is to a player's advantage to recycle, and say, "Recycle a lot," "Don't sell your drillers," "Cheat."
RECYCLE MEAN IN THIS GAME?	--respond, "Reuse something," "To use something over."
CYCLED IN OUR GAME?	--respond, "The oil rig."
EOPLE RECYCLE OIL RIGS?	--respond, "Save money," "Use the scrap metal," "Run out of metal otherwise."
UN OUT OF METAL TO MAKE OIL RIGS?	--respond, "Yes," "Don't know."
ENDLESS AMOUNTS OF THE THINGS WE NG FOR IN OUR GAME?	--respond, "No."
HAPPEN TO THE LAND IF WE GO ON E GAME FOR A LONG TIME?	--infer, "It will run out."
ABLE TO FIND THINGS BY DRILLING	--respond, "No."

MATERIALS

TEACHING STRATEGIES

IF WE COULDN'T GET ANY MORE GOLD, WHAT COULD WE DO TO STOP RUNNING OUT OF GOLD?

WHAT ARE SOME THINGS PEOPLE TRY TO RECYCLE?

DO YOU RECYCLE ANYTHING?

List on the chalkboard as many recyclable items or materials as the students can name.

WHY DO WE TRY TO RECYCLE THESE THINGS?

HOW DO PEOPLE BENEFIT FROM RECYCLING THINGS?

DOES RECYCLING COST MONEY LIKE IT DID IN THE GAME?

THEN WHY DO WE DO IT?

Then conclude with this statement:

AS A MATTER OF FACT, THERE ARE MANY THINGS IN OUR ENVIRONMENT THAT ARE IN DANGER OF BEING USED UP BECAUSE THERE IS ONLY A CERTAIN AMOUNT OF THEM. ONCE THAT AMOUNT IS USED THERE WILL BE NO MORE. FOR THOSE MATERIALS, WHAT MUST BE DONE?

THERE ARE THREE REASONS FOR RECYCLING. WHAT ARE THEY?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
E COULDN'T GET ANY MORE GOLD, WHAT COULD WE) STOP RUNNING OUT OF GOLD?	--infer, "Recycle."
ARE SOME THINGS PEOPLE TRY TO RECYCLE?	--name a variety of items such as bottles, cans, clothes, cars, oil, paper, glass, metal, water, aluminum, etc.
OU RECYCLE ANYTHING?	--reply, "No," "Yes, I pick up beer cans," "Take pop bottles back to the store."
he chalkboard as many recyclable items or as the students can name.	
DO WE TRY TO RECYCLE THESE THINGS?	--respond, "Because we will run out," "For money," "Get your money back on pop bottles."
DO PEOPLE BENEFIT FROM RECYCLING THINGS?	--respond, "Have materials to use over again," "Saves money," "Things last longer."
RECYCLING COST MONEY LIKE IT DID IN THE ?	--respond, "Yes," "No," "May make money."
WHY DO WE DO IT?	--infer, "Might be necessary," "No other place to get materials," "Cheaper than buying new stuff."
lude with this statement:	
MATTER OF FACT, THERE ARE MANY THINGS IN NVIRONMENT THAT ARE IN DANGER OF BEING UP BECAUSE THERE IS ONLY A CERTAIN AMOUNT EM. ONCE THAT AMOUNT IS USED THERE WILL BE RE. FOR THOSE MATERIALS, WHAT MUST BE ?	--indicate that such finite materials must be recycled if the use of them is to continue.
ARE THREE REASONS FOR RECYCLING. WHAT HEY?	--indicate an understanding of the rationale for recycling by making statements that mean:

MATERIALS

TEACHING STRATEGIES

Write the three reasons on the chalkboard, using the students' terminology.

Set aside one game for students to take home to play with their friends and families. Allow the students to check the game out for one or more days.

This activity has given students some opportunity to deal with the concept of recycling. However, the Recycling Payoff Game has approached the concept somewhat abstractly in dealing with oil rigs, buying land, and strikes and misses. The students, therefore, may have greatly enjoyed the game without relating the concept of recycling to themselves. While the concept of recycling may be of the utmost importance, the value of the game should not be minimized as an enjoyable experience.

In order to assess the students' ability to transfer the concept of recycling to a more personal concrete level, ask each student to take out a piece of paper and a pencil. Then say:

> YOU AND YOUR FAMILY HAVE MANY THINGS IN YOUR HOMES. I WOULD LIKE YOU TO WRITE DOWN AS MANY THINGS AS YOU CAN THINK OF. I WILL HELP YOU SPELL THE WORDS.

During the time the students are writing, circulate around the room and give the students help in spelling

TEACHING STRATEGIES

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ANTICIPATED STUDENT BEHAVIORS

Students should:

- -some materials are in finite supply, "So we won't run out of stuff."
- -it is wise long-term economics to recycle, "Cheaper to buy used stuff," "Can make money."
- -it helps alleviate the solid waste disposal problem, "Won't be so much junk around."

MATERIALS

TEACHING STRATEGIES

the things they think of. Because this is an attempt to learn how your students think, please do not suggest things they may have in their homes. If some students have trouble getting started and ask for help, give a slight hint, such as, "What kinds of things do you have in your bedroom?" but do not give the name of an item.

When all students have had sufficient time to make a list, say:

> NOW DRAW A CIRCLE AROUND ALL OF THE THINGS ON YOUR LIST THAT HAVE BEEN RECYCLED.

When all students have finished say:

> NOW THINK IF THE OTHER THINGS ON YOUR LIST COULD HAVE BEEN RECYCLED. MARK AN X BY THOSE THAT COULD HAVE BEEN.

When all students have finished, collect the papers. Then discuss the activity with the students and hear their justifications for their answers. Please send the papers to BSCS with any comments you may have about them.

TEACHING STRATEGIES

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ANTICIPATED STUDENT BEHAVIORS

Upon completion of this activity, each student should, as a minimum:

--be able to play the Recycling Payoff Game
--have stated at least one benefit of recycling
--be able to suggest at least one recyclable material.

ACTIVITY 4-25

Activity name suggested by class:

Teacher________________________

BSCS USE: Post___ Tally___ Rev___

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1. Date taught (month and date, e.g. 11/2)						
2. Minutes of class time on science each day						
3. Minutes preparing for each day's science class						
4. Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s)______________ Comment:

Specific Questions:

12. Did any students not enjoy the recycling game? ☐ No ☐ Yes Discuss:

13. How difficult are the rules for the students?

BSCS Evaluation:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

11. Your rating of this activity:

☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s)______________ Comment:

Specific Questions:

12. Did any students not enjoy the recycling game? ☐ No ☐ Yes Discuss:

13. How difficult are the rules for the students?

Side A

BSCS Evaluation: EMH Feedback Form 1d

Teacher ______________________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

BSCS Evaluation: E

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff (we will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

2. Develop an understanding of cycling and appreciate the cycling relationship of the materials and organisms in the environment.

4. Realize that because certain materials are in finite supply, the extent to which man uses these materials will have an impact on the environment.

5. Comprehend the role of man as an integral part of nature not apart from nature.

Core C Objectives for the Student:

3. Recognize the need to recycle materials.

4. Identify ways to recycle materials.

ENVIRONMENTAL THEME:

Cyclic Nature of Processes, Finiteness of Resources

INQUIRY SKILLS:

Applying

PROBLEM-SOLVING SKILLS:

Knowing Question and Task

PRACTICAL APPLICATION:

Stimulate Artistic or Hobby Interests

ACTIVITY

Goals for the Student:

2. Develop an understanding of cycling and appreciate the cycling relationship of the materials and organisms in the environment.

. Realize that because certain materials are in finite supply, the extent to which man uses these materials will have an impact on the environment.

. Comprehend the role of man as an integral part of nature not apart from nature.

Objectives for the Student:

. Recognize the need to recycle materials.

. Identify ways to recycle materials.

AL THEME:
Nature of Processes, Finiteness of
ces

LLS:
ng

VING SKILLS:
g Question and Task

PPLICATION:
ate Artistic or Hobby Interests

BSCS

UNIT IV. TRANSFER AND CYCLING
OF MATERIALS IN
MY ENVIRONMENT

CORE C. GARBAGE AND
MY ENVIRONMENT

ACTIVITY 4-26. ME, RECYCLING,
AND ART

ACTIVITY
4-26

MATERIALS

*Recycled materials
*Art supplies

*Not furnished in materials kit

TEACHING STRATEGIES

Activity 4-26. Me, Recycling, and Art

This last of three recycling activities should allow students the opportunity to create something useful or artistic from recycled materials. It is a practical and concrete way to complete the unit.

Teacher Preparation:

The success of this activity will depend on the number of materials collected by the students, the tools provided b you, and the enthusiasm created by all. Encourage as muc creativity and enthusiasm in your students as you can.

Direct your students' attention to the collected material and tell them that they will now create something from th recycled materials they've been collecting for the past days and weeks. Place few, if any, limits on their creativity other than that the materials used (except for glue, nails, tools, etc.) must be truly waste, things that would normally be thrown away. You will provide as many of the tools and working materials as possible, but encourage students to bring in their own tools to work with also. Contact the art, industrial arts, and home economics instructors for ideas and assistance if necessary.

Allow the students as much freedom as possible, and provide assistance only when necessary or requested. Remember the success your students had in constructing spaceships from Styrofoam cups in Unit I.

Be enthusiastic! Discuss with your class a few of the projects listed below. Solicit student ideas and give praise for all creative suggestions.

TEACHING STRATEGIES

26. Me, Recycling, and Art

f three recycling activities should allow
e opportunity to create something useful or
om recycled materials. It is a practical
e way to complete the unit.

paration:

of this activity will depend on the number of
ollected by the students, the tools provided by
e enthusiasm created by all. Encourage as much
and enthusiasm in your students as you can.

students' attention to the collected materials
em that they will now create something from the
terials they've been collecting for the past
eks. Place few, if any, limits on their
other than that the materials used (except
ils, tools, etc.) must be truly waste,
would normally be thrown away. You will
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if necessary.

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stance only when necessary or requested.
success your students had in constructing
from Styrofoam cups in Unit I.

tic! Discuss with your class a few of the
ted below. Solicit student ideas and give
ll creative suggestions.

ANTICIPATED STUDENT BEHAVIORS

During this activity, each student should:

--select recycled materials of his choice for incorporation into an artistic or useful object
--complete the construction of his recycled art or utilitarian form
--recognize that some waste materials may be reused and serve a useful purpose.

MATERIALS

TEACHING STRATEGIES

Following are some suggested projects:

1. Christmas tree decorations made from old flash cubes, light bulbs, Popsicle sticks, tin can covers, gum wrappers or newspaper chains.
2. Ash trays or coasters from tin cans.
3. Waste baskets from circular cardboard or metal drums.
4. Terrariums from old bottles.
5. Swings from old tires.
6. Pencil holders from old tin cans.
7. Window decorations or grouted hot pads from tumbled bits of colored glass.
8. Doll furniture from lumber scraps.
9. Three-dimensional collages.
10. Abstract sculptures.
11. Needlework projects with scraps of material.
12. Glasses from bottles cut with a bottle cutter and sanded.
13. Mobiles from scraps of metal.

TEACHING STRATEGIES

me suggested projects:

tree decorations made from old flash
ht bulbs, Popsicle sticks, tin can
m wrappers or newspaper chains.

or coasters from tin cans.

ets from circular cardboard or metal

from old bottles.

m old tires.

ders from old tin cans.

orations or grouted hot pads from
ts of colored glass.

ture from lumber scraps.

nsional collages.

culptures.

projects with scraps of material.

om bottles cut with a bottle cutter

om scraps of metal.

ANTICIPATED STUDENT BEHAVIORS

Upon completion of this activity, each student should, as a minimum:

--have completed a recycled art or utilitarian object.

ACTIVITY
4-26

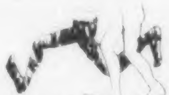
MATERIALS

TEACHING STRATEGIES

See Change of Pacers 30 and 31.

TEACHING STRATEGIES

ANTICIPATED STUDENT BEHAVIORS



CHANGE OF PACER

of Pacers 30 and 31.

ACTIVITY 4-26

Activity name suggested by class:

Teacher____________________

BSCS USE: Post___ Tally___ Rev___

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is
☐ Of value--needs the revision suggested
☐ Worth salvaging--make major changes described
☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s)______________ Comment:

Specific Questions:

12. How did you obtain the "recycled materials"?

13. What items were most in demand?

BSCS Evaluation:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is
☐ Of value--needs the revision suggested
☐ Worth salvaging--make major changes described
☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s)______________ Comment:

Specific Questions:

12. How did you obtain the "recycled materials"?

13. What items were most in demand?

14. Were you and the students pleased with what was made?

15. What was made? Would you send photographs to us?

BSCS Evaluation: EMH Feedback Form 1d

Side A

Teacher ____________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

BSCS Evaluation: EM

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff (we will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

BSCS Evaluation: EMH Feedback Form 1d

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

2. Develop an understanding of cycling and appreciate the cycling relationship of the materials and organisms in the environment.

3. Recognize the role of decomposers in the cycling process.

4. Realize that because certain materials are in finite supply, the extent to which man uses these materials will have an impact on the environment.

5. Comprehend the role of man as an integral part of nature not apart from nature.

Core C Objectives for the Student:

1. Perceive that garbage (solid waste) presents a difficult man-made problem.

2. Recognize the composition of daily garbage.

3. Recognize the need to recycle materials.

4. Identify ways to recycle materials.

5. Realize the positive role microbes play in the decomposition process.

ENVIRONMENTAL THEME:

Cyclic Nature of Processes, Finiteness of Resources

INQUIRY SKILLS:

Associating, Applying

ACTIVITY

Goals for the Student:

2. Develop an understanding of cycling and appreciate the cycling relationship of the materials and organisms in the environment.

3. Recognize the role of decomposers in the cycling process.

4. Realize that because certain materials are in finite supply, the extent to which man uses these materials will have an impact on the environment.

5. Comprehend the role of man as an integral part of nature not apart from nature.

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1. Perceive that garbage (solid waste) presents a difficult man-made problem.

2. Recognize the composition of daily garbage.

3. Recognize the need to recycle materials.

. Identify ways to recycle materials.

5. Realize the positive role microbes play in the decomposition process.

AL THEME:
Nature of Processes, Finiteness of
ces

LLS:
ating, Applying

BSCS

UNIT IV.	TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT
CORE C.	GARBAGE AND MY ENVIRONMENT
ACTIVITY 4-27.	CLUES TO SUCCESS

PROBLEM-SOLVING SKILLS:
Discussion, Explaining

PRACTICAL APPLICATION:
Practicing Writing Skills:

Activity 4-27. Clues to Success

In this activity the students are given the opportunity to express their attitudes about recycling and garbage. Two worksheets and four slides serve as a stimulus for discussion.

DISTRIBUTE MAT

Worksheet 4-9
Worksheet 4-10
Slides 4-35 through 4-38
*35 mm Slide projector
*Tape recorder
*Blank cassette(s)

*Not furnished in materials kit

Part I.

In previous activities students have been given the opportunity to practice following one direction at a time. In this activity students will be asked to follow a series of three directions given at the same time. This task requires students to keep several things in their memories and is more difficult than following single directions.

Before beginning the activity, turn to the Progress in Following Directions page of the Student Record of Progress. Using the guidelines, rate students on their ability to follow directions that involve a series of steps.

LVING SKILLS:
ssion, Explaining

APPLICATION:
icing Writing Skills:

Clues to Success

the students are given the opportunity
attitudes about recycling and garbage.
and four slides serve as a stimulus for

DISTRIBUTE MATERIALS

ivities students have been given the
practice following one direction at a
activity students will be asked to follow
e directions given at the same time.
es students to keep several things in
and is more difficult than following
s.

the activity, turn to the Progress in
ions page of the Student Record of
the guidelines, rate students on their
w directions that involve a series of

BSCS

During this activity, each student should:

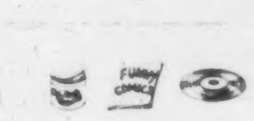
- *--express his attitudes toward garbage and recycling by completing Worksheets 4-9 and 4-10*
- *--defend his answers to the questions on Worksheets 4-9 and 4-10.*

ACTIVITY
4-27

MATERIALS

Worksheet 4-9

Slide 4-35, Worksheet 4-9A



TEACHING STRATEGIES

Distribute Worksheet 4-9.

Then say:

> FIRST, FIND SIDE A OF YOUR WORKSHEET. TODAY YOU ARE GOING TO HAVE ANOTHER CHANCE TO PRACTICE FOLLOWING DIRECTIONS.

Then say:

> THIS TIME I WILL TELL YOU TO DO THREE THINGS. YOU WILL NEED TO LISTEN CAREFULLY BECAUSE I WILL TELL YOU ALL THREE THINGS BEFORE YOU BEGIN. I WILL SAY THE DIRECTIONS TWICE AND WILL NOT REPEAT THEM AGAIN.
>
> LISTEN CAREFULLY, HERE ARE THE DIRECTIONS:
>
> WRITE YOUR NAME IN THE UPPER LEFT-HAND CORNER OF YOUR PAPER.
>
> PRINT THE DATE IN THE UPPER RIGHT-HAND CORNER OF YOUR PAPER.
>
> DRAW A CIRCLE AROUND YOUR FIRST NAME.

When all students have followed the directions, say:

> NOW I WOULD LIKE YOU TO ANSWER SOME QUESTIONS ABOUT RECYCLING AND GARBAGE.

Project each question, Slides 4-35 through 4-38, separately. Read Question 1 and the answer choices aloud to the students. Allow ample time for them to mark their worksheets. Repeat this procedure for the next three questions.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
Worksheet 4-9.	Students should:
FIND SIDE A OF YOUR WORKSHEET. TODAY E GOING TO HAVE ANOTHER CHANCE TO PRACTICE ING DIRECTIONS.	
IME I WILL TELL YOU TO DO THREE THINGS. LL NEED TO LISTEN CAREFULLY BECAUSE I ELL YOU ALL THREE THINGS BEFORE YOU BEGIN. SAY THE DIRECTIONS TWICE AND WILL NOT THEM AGAIN.	
CAREFULLY, HERE ARE THE DIRECTIONS:	
OUR NAME IN THE UPPER LEFT-HAND CORNER R PAPER.	
HE DATE IN THE UPPER RIGHT-HAND CORNER R PAPER.	
CIRCLE AROUND YOUR FIRST NAME.	
dents have followed the directions, say:	
OULD LIKE YOU TO ANSWER SOME QUESTIONS ECYCLING AND GARBAGE.	
question, Slides 4-35 through 4-38, Read Question 1 and the answer choices students. Allow ample time for them to orksheets. Repeat this procedure for the uestions.	--recognize the comic book in Question 1, as the only biodegradable material and mark Picture C with an X.

MATERIALS

TEACHING STRATEGIES

Slide 4-36, Worksheet 4-9A

When reading Question 2, be sure to emphasize that more than one answer can be marked.

After all students have had the opportunity to answer all of the questions, collect the worksheets. Then project each slide and discuss the answers with them. Have them defend their choices. Since Questions 2, 3, and 4 assess attitude as well as concept, the student should be given due credit for defending his answer in a logical manner. Allow them to challenge one another. The discussion will give you insight about which points still need to be stressed.

Slide 4-37, Worksheet 4-9B

INVOLVE YO
SLOWEST
STUDENTS

Slide 4-38, Worksheet 4-9B

After class tally the students' answers on Tallysheet 4-6. Consider whether the whole class needs further review or if a few individuals need special attention.

Part II.

Distribute Worksheet 4-10 and have each student write his name and the date on it. Read the question and explain what is to be done. Let the students interpret the four pictures themselves, however.

TEACHING STRATEGIES

tion 2, be sure to emphasize that more
an be marked.

s have had the opportunity to answer all
collect the worksheets. Then project
scuss the answers with them. Have them
ces. Since Questions 2, 3, and 4
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ed.

INVOLVE YOUR
SLOWEST
STUDENTS

the students' answers on Tallysheet
ther the whole class needs further
individuals need special attention.

et 4-10 and have each student write
ate on it. Read the question and
be done. Let the students interpret
themselves, however.

ANTICIPATED STUDENT BEHAVIORS

Students should:

--recognize that all the choices in Question 2 contribute to the garbage problem, and so mark.

--in Question 3 mark Choice B as the word that best describes garbage microbes.

--choose B in Question 4 as the best thing for our environment.

ACTIVITY
4-27

MATERIALS

Worksheet 4-10

TEACHING STRATEGIES

Give the students a choice of how they wish to complete the story on their own. Have paper available and a tape recorder for those students who wish to use it.

Fill in Tallysheet 4-7 applying to Worksheet 4-10. Send both tallysheets to BSCS.

Send all responses to Worksheet 4-10 to BSCS.

Interpreting and Scoring Worksheet 4-9. All of the items on this worksheet are summarized on Tallysheet 4-6 which should be used to record results on the Concepts page of the Student Record of Progress. Item 1 assesses the concept that only organic matter is decomposed. Students use the inquiry skills of associating and applying to answer the question. Review the compost activities for those students who marked a wrong answer.

Turn to the Concepts page of the Student Record of Progress. Find the column marked "Activity 4-27, Biodegradable." Circle YES if the student marked choice C, the comic book. Otherwise, circle NO.

Item 2 assesses the concept that garbage is a problem. Four or more choices should be marked. Those students marking less than four need help in understanding this concept. Review Activity 4-20 for these students.

Find the column marked "Activity 4-27, Garbage Problem." Circle HIGH if the student marked more than four choices. Circle LOW if the student marked less than three choices. Circle SOME for all other students.

TEACHING STRATEGIES

tudents a choice of how they wish to complete
on their own. Have paper available and a tape
or those students who wish to use it.

llysheet 4-7 applying to Worksheet 4-10.
tallysheets to BSCS.

esponses to Worksheet 4-10 to BSCS.

ng and Scoring Worksheet 4-9. All of the
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. Students use the inquiry skills of
g and applying to answer the question. Review
t activities for those students who marked
swer.

e Concepts page of the Student Record of
Find the column marked "Activity 4-27,
ble." Circle YES if the student marked
the comic book. Otherwise, circle NO.

esses the concept that garbage is a problem.
e choices should be marked. Those students
s than four need help in understanding this
Review Activity 4-20 ~~for~~ these students.

olumn marked "Activity 4-27, Garbage Problem."
if the student marked more than four choices.
if the student marked less than three choices.
for all other students.

ANTICIPATED STUDENT BEHAVIORS

Students should:

--complete the story with any number of intermediate steps, but at least one step should indicate a recycling use such as: returning it to a recycling center, using it to make papier-mache, shredding it for packing materials, and so forth.

MATERIALS

TEACHING STRATEGIES

Item 3 assesses students' understanding that microbes are living things and can be helpful to man. Previous activities in Unit II and IV have stressed this concept. It is important that students understand this concept. Necessary review is mandatory for any who marked this question incorrectly.

Find the column marked "Activity 4-27, Microbes." Circle YES if the student marked choice B, Helpful. Otherwise, circle NO.

Item 4 -- The concept that recycling is best for the environment is assessed in this question. Some may mark A, but the correct answer is B. Be sure your review of the worksheet includes a discussion of this question. This will give insight into which points still need to be stressed.

Find the column marked "Activity 4-27, Recycling." Circle YES if the student marked choice B, recycling the soda bottles. Otherwise, circle NO.

Turn to the Progress in Following Directions page of the Student Record of Progress. Circle YES if students were able to carry out all parts of the direction. Circle NO if students were not able to carry out any part of the direction. Circle PART for all other students.

Information for scoring Worksheet 4-10 appears on Tallysheet 4-7.

TEACHING STRATEGIES

tudents' understanding that microbes
and can be helpful to man. Previous
t II and IV have stressed this concept.
hat students understand this concept.
is mandatory for any who marked this
tly.

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t answer is B. Be sure your review of
ludes a discussion of this question.
sight into which points still need to

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t marked choice B, recycling the soda
se, circle NO.

ess in Following Directions page of
d of Progress. Circle YES if students
y out all parts of the direction. Circle
re not able to carry out any part of
ircle PART for all other students.

coring Worksheet 4-10 appears on

ANTICIPATED STUDENT BEHAVIORS

Upon completion of this activity, each student should, as a minimum:

--have completed Worksheet 4-9
--have indicated an ending to the picture story in Worksheet 4-10.

ACTIVITY 4-27

Activity name suggested by class:

Teacher_______________

BSCS USE: Post___ Tally___ Rev___

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s)_______________ Comment:

Specific Questions:

12. Were any items on Worksheet 4-9 unsatisfactory? ☐ No ☐ Yes Which ones?________
Explain:

13. Would you suggest other assessments of the understandings in Unit IV?

BSCS Evaluation:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

11. Your rating of this activity:

☐ Worthwhile --keep as is
☐ Of value--needs the revision suggested
☐ Worth salvaging--make major changes described
☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s)______________ Comment:

Specific Questions:

12. Were any items on Worksheet 4-9 unsatisfactory? ☐ No ☐ Yes Which ones?________ Explain:

13. Would you suggest other assessments of the understandings in Unit IV?

14. Please send in Tallysheets 4-6 and 4-7 and Worksheet 4-9.

BSCS Evaluation: EMH Feedback Form 1d

Side A

Teacher ______________________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

BSCS Evaluation: EM

BSCS Evaluation: EMH Feedback Form 1d

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff (we will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

FOCUS FOR THIS ACTIVITY

CONTENT:

Unit Goals for the Student:

1. Develop an understanding of the flow of energy through the living world.
2. Develop an understanding of cycling and appreciate the cycling relationship of the materials and organisms in the environment.
3. Recognize the role of decomposers in the cycling process.
4. Realize that because certain materials are in finite supply, the extent to which man uses these materials will have an impact on the environment.
5. Comprehend the role of man as an integral part of nature not apart from nature.

Core C Objectives for the Student:
None indicated

ENVIRONMENTAL THEME:
Interrelationships of Environmental Components, Flow of Energy, Cyclic Nature of Processes

INQUIRY SKILLS:
Applying

PROBLEM-SOLVING SKILLS:
Interpreting Results

PRACTICAL APPLICATION:
Using What Has Been Learned

ACTIVITY

Goals for the Student:

1. Develop an understanding of the flow of energy through the living world.

2. Develop an understanding of cycling and appreciate the cycling relationship of the materials and organisms in the environment.

3. Recognize the role of decomposers in the cycling process.

4. Realize that because certain materials are in finite supply, the extent to which man uses these materials will have an impact on the environment.

5. Comprehend the role of man as an integral part of nature not apart from nature.

Objectives for the Student:
None indicated

AL THEME:
elationships of Environmental Components,
f Energy, Cyclic Nature of Processes

LLS:
ng

VING SKILLS:
reting Results

PPLICATION:
What Has Been Learned

BSCS

UNIT IV. TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT

CORE C. GARBAGE IN MY ENVIRONMENT

ACTIVITY 4-28. WHAT DO YOU THINK?

ACTIVITY
4-28

MATERIALS

Worksheets 4-11 through 4-14
Slide 4-39
*35 mm Slide projector

Worksheet 4-11

*Not furnished in materials kit

TEACHING STRATEGIES

Activity 4-28. What Do You Think?

This activity reviews the variety of things students have done in Unit IV. It provides an indication of the students' interest in science and identifies those activities that were most popular. Some major skills and concepts are assessed to provide an indication of the students' understanding of this unit. Following this activity is a repeat of favorite activities; a review of difficult concepts closes the unit. Student responses are scored and recorded, the Student Record of Progress is reviewed, and a summary of each student's progress in Unit IV is prepared.

Part I. First Day

Distribute Worksheet 4-11 and say:

> WE HAVE DONE LOTS OF THINGS IN SCIENCE THIS YEAR. LET'S LOOK BACK AT SOME OF THE THINGS WE HAVE DONE. AS I READ THE DESCRIPTION OF AN ACTIVITY WE DID, MARK WHETHER YOU LIKED IT, WERE NOT INTERESTED, DISLIKED IT, OR DON'T REMEMBER IT. FOR SOME ACTIVITIES, YOU WILL HAVE A CHANCE TO SHOW WHAT YOU LEARNED. AFTER WE FINISH THE WORKSHEET, YOU WILL HAVE A CHANCE TO TALK ABOUT THE ACTIVITIES, AND WE CAN DO SOME OF THEM AGAIN IF YOU LIKE.

The activities listed on Worksheet 4-11, 4-12, 4-13, and 4-14 do not correspond to the numbering of activities in the Teacher's Guide. Some activities have been combined. Clues to Success are not listed. The following list keys the worksheet activities to the Guide. Read the brief description of each activity that is on the worksheet to remind students of the activity. Be sure to add comments calling upon personal experiences in your class. If you wish to dramatize the activities, you could set up and display some equipment used in the activity.

TEACHING STRATEGIES

28. What Do You Think?

y reviews the variety of things students have
IV. It provides an indication of the
terest in science and identifies those
hat were most popular. Some major skills
are assessed to provide an indication of the
derstanding of this unit. Following this
a repeat of favorite activities; a review
concepts closes the unit. Student
e scored and recorded, the Student Record of
reviewed, and a summary of each student's
Unit IV is prepared.

st Day

orksheet 4-11 and say:

DONE LOTS OF THINGS IN SCIENCE THIS YEAR.
OOK BACK AT SOME OF THE THINGS WE HAVE
AS I READ THE DESCRIPTION OF AN ACTIVITY
MARK WHETHER YOU LIKED IT, WERE NOT
TED, DISLIKED IT, OR DON'T REMEMBER IT.
E ACTIVITIES, YOU WILL HAVE A CHANCE TO
AT YOU LEARNED. AFTER WE FINISH THE
ET, YOU WILL HAVE A CHANCE TO TALK ABOUT
IVITIES, AND WE CAN DO SOME OF THEM
F YOU LIKE.

es listed on Worksheet 4-11, 4-12, 4-13, and
correspond to the numbering of activities
er's Guide. Some activities have been
lues to Success are not listed. The
st keys the worksheet activities to the
the brief description of each activity
he worksheet to remind students of the
e sure to add comments calling upon personal
in your class. If you wish to dramatize
es, you could set up and display some
ed in the activity.

ANTICIPATED STUDENT BEHAVIORS

During this activity, each student should:

--recall each described activity in Unit IV and rate his opinion of it
--answer each of the questions on Worksheets 4-11, 4-12, 4-13, and 4-14
--review the questions
--repeat selected activities.

MATERIALS

Slide 4-39, Worksheet 4-11A

TEACHING STRATEGIES

Now project Slide 4-39 of Worksheet 4-11A and explain what they will be doing and now they should mark their opinions and answer the questions.

Have the students begin the worksheet by finding the side that starts with "1. Making Compost." Have them put the date and their names on the worksheet.

Turn off the projector.

Then say:

> HOW MANY OF YOU REMEMBER MAKING THE COMPOST PILES?

Direct the students' attention to the worksheet and read through each question twice, giving them time to fill in their answers.

1. (Activity 4-0) Making Compost.

   AT THE BEGINNING OF THE UNIT WE MADE COMPOST PILES IN PLASTIC BOXES.

   WHAT WAS YOUR OPINION OF THAT ACTIVITY? MARK AN X IN THE SPACE ON THE RIGHT SIDE OF YOUR PAPER TO SHOW IF YOU LIKED IT, IF YOU WERE NOT INTERESTED, IF YOU DISLIKED IT, OR IF YOU DON'T REMEMBER THAT ACTIVITY. IF YOU WERE ABSENT, YOU MIGHT HAVE MISSED SOME OF THESE ACTIVITIES.

   NOW LET'S TEST YOUR MEMORY. WHAT DID WE PUT IN OUR COMPOST PILES? WRITE DOWN ALL THE THINGS YOU CAN REMEMBER ON THE LINES BELOW QUESTION 1.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
e 4-39 of Worksheet 4-11A and explain e doing and how they should mark their wer the questions.	
s begin the worksheet by finding the with "1. Making Compost." Have them their names on the worksheet.	--write their names and the date on Worksheet 4-11.
jector.	
YOU REMEMBER MAKING THE COMPOST	--respond by raising hands.
nts' attention to the worksheet and read stion twice, giving them time to fill .	
4-0) Making Compost.	
NNING OF THE UNIT WE MADE ES IN PLASTIC BOXES.	
UR OPINION OF THAT ACTIVITY? MARK SPACE ON THE RIGHT SIDE OF YOUR OW IF YOU LIKED IT, IF YOU WERE TED, IF YOU DISLIKED IT, OR IF EMEMBER THAT ACTIVITY. IF YOU WERE MIGHT HAVE MISSED SOME OF THESE	--mark X's in the columns to indicate their opinions.
EST YOUR MEMORY. WHAT DID WE PUT OST PILES? WRITE DOWN ALL THE CAN REMEMBER ON THE LINES BELOW	--write down things that were put into the compost piles.

MATERIALS

TEACHING STRATEGIES

**GIVE
TIME
TO
THIN**

If necessary, direct students not to share their answers until the worksheets have been completed. Assist students with spelling as necessary.

2. (Activities 4-1 and 4-2) Food Chains.

   WE PLAYED THE FOOD CHAIN GAME WITH CARDS THAT HAD PICTURES OF PLANTS AND ANIMALS.

   MARK AN X TO SHOW YOUR OPINION OF THIS ACTIVITY.

   CAN YOU REMEMBER HOW TO MAKE A FOOD CHAIN? CHOOSE THE RIGHT WORDS UNDER QUESTION 2 TO WRITE IN THE BLANKS TO COMPLETE THIS FOOD CHAIN: SOMETHING, FROG, INSECT, SOMETHING. THE WORDS ARE: DEER, MAN, GRASS, SNAKE, COW.

3. (Activity 4-3) The Long Journey.

   REMEMBER WHEN WE READ *THE LONG JOURNEY* TOGETHER? WE FOLLOWED THE JOURNEY OF A PIECE OF BODY-BUILDING MATERIAL UNTIL IT BECAME A PART OF YOUR HAIR. MARK AN X TO SHOW YOUR OPINION OF THIS ACTIVITY.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
y, direct students not to share their il the worksheets have been completed. ents with spelling as necessary.	
vities 4-1 and 4-2) Food Chains. YED THE FOOD CHAIN GAME WITH CA DS THAT CTURES OF PLANTS AND ANIMALS. N X TO SHOW YOUR OPINION OF THIS TY.	--mark X's in the columns to indicate their opinions.
J REMEMBER HOW TO MAKE A FOOD CHAIN? THE RIGHT WORDS UNDER QUESTION 2 TO IN THE BLANKS TO COMPLETE THIS FOOD SOMETHING, FROG, INSECT, SOMETHING. RDS ARE: DEER, MAN, GRASS, SNAKE, COW.	--fill in the blanks with "Snake," and "Grass."
vity 4-3) The Long Journey. ER WHEN WE READ *THE LONG JOURNEY* TOGETHER? OWED THE JOURNEY OF A PIECE OF BODY-G MATERIAL UNTIL IT BECAME A PART OF IR. MARK AN X TO SHOW YOUR OPINION OF TIVITY.	--mark X's in the columns to indicate their opinions.

GIVE STUDENTS
TIME
TO
THINK

MATERIALS	TEACHING STRATEGIES
	HOW DID THE BODY-BUILDING MATERIAL GET FROM THE COW'S LEG TO YOUR HAIR? WRITE YOUR ANSWER ON THE LINES UNDERNEATH QUESTION 3. Assist students with spelling as necessary. 4. (Activity 4-4) Food Webs. REMEMBER WHEN WE PUT PICTURES OF PLANTS AND ANIMALS ON THE FLOOR AND PUT PIECES OF YARN BETWEEN THEM? WE MADE A FOOD WEB THAT SHOWED HOW LIVING THINGS DEPEND ON EACH OTHER FOR FOOD. MARK AN X TO SHOW YOUR OPINION OF THIS ACTIVITY. WHAT HAPPENED WHEN ONE PLANT OR ANIMAL WAS TAKEN OUT OF THE FOOD WEB? WRITE YOUR ANSWER UNDER QUESTION 4. Assist students with spelling as necessary. 5. (Activity 4-6) Food Webs in Other Places. WE SAW SOME SLIDES OF ANIMALS AND PLANTS THAT LIVE TOGETHER IN DIFFERENT PLACES AROUND THE WORLD. MARK AN X TO SHOW YOUR OPINION OF THIS ACTIVITY. WHAT DID WE LEARN FROM THESE PICTURES?

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
BODY-BUILDING MATERIAL GET FROM G TO YOUR HAIR?	
NSWER ON THE LINES UNDERNEATH	--write answers such as, "I ate it," "I ate hamburger," "Went into my stomach," etc.
ith spelling as necessary.	
-4) Food Webs.	
N WE PUT PICTURES OF PLANTS AND HE FLOOR AND PUT PIECES OF YARN ? WE MADE A FOOD WEB THAT SHOWED HINGS DEPEND ON EACH OTHER FOR	
SHOW YOUR OPINION OF THIS ACTIVITY.	--mark X's in the columns to indicate their opinions.
D WHEN ONE PLANT OR ANIMAL WAS THE FOOD WEB?	
NSWER UNDER QUESTION 4.	--write answers such as "Other animals died," "Animals went hungry," and so on.
ith spelling as necessary.	
-6) Food Webs in Other Places.	
SLIDES OF ANIMALS AND PLANTS THAT R IN DIFFERENT PLACES AROUND THE	
SHOW YOUR OPINION OF THIS ACTIVITY.	--mark an X in one of the opinion columns.
LEARN FROM THESE PICTURES?	

ACTIVITY
4-28

MATERIALS

Worksheet 4-12

TEACHING STRATEGIES

MARK AN X ON YOUR CHOICES. YOU MAY CHOOSE MORE THAN ONE. THE CHOICES ARE:

A. ANIMALS NEED OTHER ANIMALS.

B. ANIMALS NEED PLANTS.

C. PLANTS NEED ANIMALS.

D. FISH DON'T NEED ANYTHING ELSE.

Collect Worksheet 4-11 and distribute Worksheet 4-12.

6. (Activities 4-8 and 4-9) Decomposers.

WE SAW SOME SLIDES OF ANIMALS THAT EAT DEAD THINGS. THEN WE SET UP A HOUSE FOR SOME ANIMALS SO THAT WE COULD HAVE SOME DECOMPOSERS IN OUR CLASSROOM.

MARK AN X TO SHOW YOUR OPINION OF THIS ACTIVITY.

WHAT SORT OF ANIMALS WERE THEY?

WRITE YOUR ANSWER ON THE LINE UNDER THIS QUESTION.

WHAT DID THESE ANIMALS DO THAT MADE US DECIDE THEY WERE DECOMPOSERS?

WRITE YOUR ANSWER ON THE LINES BELOW QUESTION 6.

Assist students with spelling as necessary.

7. (Activities 4-10 and 4-11) Planting in Compost.

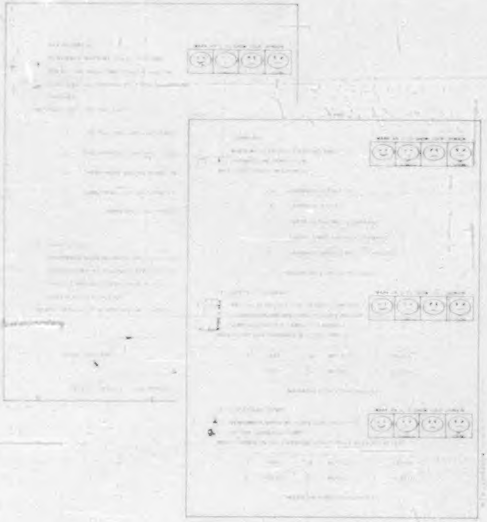
TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
N X ON YOUR CHOICES. YOU MAY CHOOSE MORE NE. THE CHOICES ARE:	
IMALS NEED OTHER ANIMALS.	
IMALS NEED PLANTS.	
ANTS NEED ANIMALS.	
SH DON'T NEED ANYTHING ELSE.	--mark an X on Choice A or B.
ksheet 4-11 and distribute Worksheet 4-12.	
vities 4-8 and 4-9) Decomposers.	
SOME SLIDES OF ANIMALS THAT EAT DEAD . THEN WE SET UP A HOUSE FOR SOME S SO THAT WE COULD HAVE SOME DECOMPOSERS CLASSROOM.	
N X TO SHOW YOUR OPINION OF THIS TY.	--mark an X in one of the opinion columns.
ORT OF ANIMALS WERE THEY?	
YOUR ANSWER ON THE LINE UNDER THIS ON.	--write down, "Pill bugs," or "Worms."
ID THESE ANIMALS DO THAT MADE US THEY WERE DECOMPOSERS?	
YOUR ANSWER ON THE LINES BELOW QUESTION 6.	--write answers such as, "They ate the leaves."
ents with spelling as necessary.	
vities 4-10 and 4-11) Planting in Compost.	

MATERIALS	TEACHING STRATEGIES
	AFTER OUR COMPOST HAD BEEN GOING FOR SEVERAL WEEKS, WE TALKED ABOUT WHAT THINGS HAD DECOMPOSED AND WHAT THINGS HADN'T BROKEN DOWN AT ALL. THEN WE USED OUR COMPOST TO PLANT SEEDS. MARK AN X TO SHOW YOUR OPINION OF THIS ACTIVITY. WHAT THINGS IN OUR COMPOST DECOMPOSED? WRITE YOUR ANSWERS ON THE LINES UNDER THIS QUESTION. WHAT THINGS IN OUR COMPOST DIDN'T DECOMPOSE? WRITE YOUR ANSWERS ON THE LINES UNDER THIS QUESTION. Assist students with spelling as necessary. 8. (Activity 4-12) Things That Breathe. WE DID AN EXPERIMENT TO SEE IF SOMETHING IN COMPOST BREATHED. WE USED A TEST SOLUTION THAT TURNED GREEN OR YELLOW IF SOMETHING BREATHED INTO IT. MARK AN X TO SHOW YOUR OPINION OF THIS ACTIVITY WHAT WERE THE THINGS IN COMPOST THAT BREATHED? WRITE YOUR ANSWER ON THE LINE. Assist students with spelling as necessary.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
OMPOST HAD BEEN GOING FOR SEVERAL ALKED ABOUT WHAT THINGS HAD AND WHAT THINGS HADN'T BROKEN . THEN WE USED OUR COMPOST TO .	
O SHOW YOUR OPINION OF THIS	--mark an X in one of the opinion columns.
IN OUR COMPOST DECOMPOSED?	
ANSWERS ON THE LINES UNDER THIS	--write such things as, "Grass," "Leaves," "Food."
IN OUR COMPOST DIDN'T DECOMPOSE?	
ANSWERS ON THE LINES UNDER THIS	--write such things as, "Plastic," "Glass," "Metal," "Bottle caps."
with spelling as necessary.	
4-12) Things That Breathe.	
XPERIMENT TO SEE IF SOMETHING IN ATHED. WE USED A TEST SOLUTION GREEN OR YELLOW IF SOMETHING TO IT.	
O SHOW YOUR OPINION OF THIS ACTIVITY	--mark an X in one of the opinion columns.
HE THINGS IN COMPOST THAT BREATHED?	
ANSWER ON THE LINE.	--write, "Microbes."
with spelling as necessary.	

MATERIALS

Worksheet 4-13



TEACHING STRATEGIES

9. (Activity 4-13) Wet and Dry.

THEN WE DID ANOTHER EXPERIMENT. WE PUT DRY FOOD IN PETRI DISHES AND ADDED WATER TO SOME OF THE DISHES. WE LEFT THEM IN A DARK PLACE FOR A FEW DAYS TO SEE WHICH GOT MOLDY FIRST.

MARK AN X TO SHOW YOUR OPINION OF THIS ACTIVITY.

DID THE FOOD GET MOLDY FASTER IF IT WAS WET OR DRY?

MARK AN X ON YOUR CHOICE, WET OR DRY.

10. (Activity 4-14) Cool and Warm.

THEN WE DID A THIRD EXPERIMENT. WE PUT DIFFERENT SORTS OF FOODS INTO TWO CARTONS. ONE CARTON WE KEPT IN THE CLASSROOM AND ONE IN THE REFRIGERATOR. WE LOOKED AT THEM EVERY DAY TO SEE WHICH SPOILED FIRST.

MARK AN X ON THE WORKSHEET TO SHOW YOUR OPINION OF THIS ACTIVITY.

WHICH PLACE DID FOODS SPOIL FASTER?

MARK AN X ON YOUR CHOICE, CLASSROOM OR REFRIGREATOR.

Collect Worksheet 4-12 and distribute Worksheet 4-13.

11. (Activity 4-17) Baking Bread.

REMEMBER WHEN WE BAKED OUR OWN BREAD? WE MADE FOUR LOAVES, AND TWO LOAVES WERE TALLER THAN THE OTHERS AFTER WE FINISHED.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
ivity 4-13) Wet and Dry.	
WE DID ANOTHER EXPERIMENT. WE PUT DRY IN PETRI DISHES AND ADDED WATER TO SOME E DISHES. WE LEFT THEM IN A DARK PLACE FEW DAYS TO SEE WHICH GOT MOLDY FIRST.	
AN X TO SHOW YOUR OPINION OF THIS ACTIVITY.	--mark an X in one of the opinion columns.
HE FOOD GET MOLDY FASTER IF IT WAS WET Y?	
AN X ON YOUR CHOICE, WET OR DRY.	--mark an X on wet.
ivity 4-14) Cool and Warm.	
WE DID A THIRD EXPERIMENT. WE PUT DIFFERENT OF FOODS INTO TWO CARTONS. ONE CARTON WE IN THE CLASSROOM AND ONE IN THE REFRIGERATOR. OKED AT THEM EVERY DAY TO SEE WHICH SPOILED	
AN X ON THE WORKSHEET TO SHOW YOUR OPINION S ACTIVITY.	--mark an X in one of the opinion columns.
PLACE DID FOODS SPOIL FASTER?	
AN X ON YOUR CHOICE, CLASSROOM OR GREATOR.	--mark an X on "classroom."
rksheet 4-12 and distribute Worksheet 4-13.	
ivity 4-17) Baking Bread.	
BER WHEN WE BAKED OUR OWN BREAD? WE MADE LOAVES, AND TWO LOAVES WERE TALLER THAN THE AFTER WE FINISHED.	

MATERIALS

TEACHING STRATEGIES

MARK AN X TO SHOW WHETHER YOU LIKED THIS ACTIVITY, WERE NOT INTERESTED, DISLIKED IT, OR DON'T REMEMBER IT.

WHY WERE TWO LOAVES TALLER?

A. THE TALLER LOAVES HAD YEAST.

B. THE SHORTER LOAVES HAD YEAST.

C. THERE WERE BAD MICROBES IN THE SHORTER LOAVES.

D. SOMETHING ATE THE SHORTER LOAVES.

MARK AN X ON YOUR CHOICE.

12. (Activity 4-18) Food Cycles.

CHOOSE ONE OF THE WORDS TO WRITE IN THE BLANK TO MAKE THIS INTO A FOOD CYCLE: MOUNTAIN LION, DEER, GRASS.

THE WORDS ARE: FROG, SNAKE, DECOMPOSER, MAN, FRUIT.

13. (Activity 4-29) Garbage.

WHEN WE STARTED LEARNING ABOUT GARBAGE WE SAW A FILM.

MARK AN X ON YOUR WORKSHEET TO SHOW YOUR OPINION OF THIS ACTIVITY.

WHAT DID THIS FILM SHOW US?

A. GARBAGE IS PRETTY.

B. GARBAGE IS UGLY.

C. THERE IS TOO MUCH GARBAGE.

TEACHING STRATEGIES

D SHOW WHETHER YOU LIKED THIS
ERE NOT INTERESTED, DISLIKED IT,
MEMBER IT.

D LOAVES TALLER?

LER LOAVES HAD YEAST.

RTER LOAVES HAD YEAST.

ERE BAD MICROBES IN THE SHORTER LOAVES.

NG ATE THE SHORTER LOAVES.

N YOUR CHOICE.

4-18) Food Cycles.

OF THE WORDS TO WRITE IN THE BLANK
S INTO A FOOD CYCLE: MOUNTAIN
GRASS.

RE: FROG, SNAKE, DECOMPOSER,

4-29) Garbage.

RTED LEARNING ABOUT GARBAGE WE

N YOUR WORKSHEET TO SHOW YOUR
THIS ACTIVITY.

S FILM SHOW US?

IS PRETTY.

IS UGLY.

TOO MUCH GARBAGE.

ANTICIPATED STUDENT BEHAVIORS

Students should:

--mark an X in one of the opinion columns.

--mark an X on A.

--write, "Decomposer."

--mark an X in one of the opinion columns.

MATERIALS

Worksheet 4-14

TEACHING STRATEGIES

D. THERE IS NOT ENOUGH GARBAGE.

E. GARBAGE SHOULD BE LEFT AROUND.

MARK AN X ON YOUR CHOICES.

YOU MAY CHOOSE MORE THAN ONE.

14. (Activities 4-21 and 4-22) Sorts of Garbage.

WE COLLECTED ALL THE TRASH FROM OUR CLASSROOM AND WEIGHED IT. THEN WE SAW SOME SLIDES OF A FAMILY'S GARBAGE.

MARK AN X TO SHOW YOUR OPINION.

WHAT SORTS OF GARBAGE WILL DECOMPOSE?

A. CANS, B. BOTTLES, C. PAPER, D. FOOD,
E. WOOD, F. PLASTIC

MARK AN X ON YOUR CHOICES. YOU MAY CHOOSE MORE THAN ONE.

15. (Activity 4-23) It's a Real Dump.

REMEMBER WHEN WE TOOK OUR FIELD TRIP TO THE GARBAGE DUMP? MARK AN X TO SHOW YOUR OPINION OF THIS ACTIVITY.

WHAT THINGS IN THE GARBAGE COULD HAVE BEEN RECYCLED?

A. CANS, B. BOTTLES C. PAPER D. FOOD
E. WOOD F. PLASTIC

MARK AN X ON YOUR CHOICES. YOU MAY CHOOSE MORE THAN ONE.

Collect Worksheet 4-13 and distribute Worksheet 4-14.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
HERE IS NOT ENOUGH GARBAGE.	
ARBAGE SHOULD BE LEFT AROUND.	
AN X ON YOUR CHOICES.	--mark an X on B and C.
AY CHOOSE MORE THAN ONE.	
ivities 4-21 and 4-22) Sorts of Garbage.	
LECTED ALL THE TRASH FROM OUR CLASSROOM EIGHED IT. THEN WE SAW SOME SLIDES OF A 'S GARBAGE.	
AN X TO SHOW YOUR OPINION.	--mark an X in one of the opinion columns.
ORTS OF GARBAGE WILL DECOMPOSE?	
NS, B. BOTTLES, C. PAPER, D. FOOD, OD, F. PLASTIC	
AN X ON YOUR CHOICES. YOU MAY CHOOSE HAN ONE.	--mark an X on C, D, and E.
ivity 4-23) It's a Real Dump.	
ER WHEN WE TOOK OUR FIELD TRIP TO THE E DUMP? MARK AN X TO SHOW YOUR OPINION S ACTIVITY.	--mark an X in the opinion columns.
HINGS IN THE GARBAGE COULD HAVE BEEN ED?	
NS, B. BOTTLES C. PAPER D. FOOD OD F. PLASTIC	
N X ON YOUR CHOICES. YOU MAY CHOOSE MORE NE.	--mark an X on A, B, C, and E.
ksheet 4-13 and distribute Worksheet 4-14.	

MATERIALS

TEACHING STRATEGIES

16. (Activity 4-24) Every Litter Bit Helps.

WE DID A PROJECT TO HELP KEEP OUR NEIGHBORHOOD CLEAN.

MARK AN X TO SHOW YOUR OPINION OF THIS ACTIVITY.

WHAT CAN YOU DO TO CUT DOWN ON THE AMOUNT OF GARBAGE?

A. PUT GARBAGE IN THE TRASH CAN.

B. DON'T USE THINGS THAT CAN'T BE RECYCLED.

C. SAVE THINGS TO BE RECYCLED.

D. DON'T RECYCLE ANYTHING.

MARK AN X ON YOUR CHOICES. YOU MAY CHOOSE MORE THAN ONE.

17. (Activity 4-25) The Recycling Payoff Game.

REMEMBER WHEN WE PLAYED THE RECYCLING PAYOFF GAME? WE DRILLED FOR OIL, GOLD, LEAD, AND OTHER THINGS.

MARK AN X TO SHOW YOUR OPINION OF THIS ACTIVITY.

WHAT WAS THE BEST WAY TO WIN THE GAME?

A. BUY LAND.

B. RECYCLE YOUR RIG.

C. SELL YOUR RIG.

D. SELL YOUR LAND.

TEACHING STRATEGIES	ANTICIPATED STUDENT BEHAVIORS
	Students should:
4-24) Every Litter Bit Helps.	
OJECT TO HELP KEEP OUR NEIGHBORHOOD	
D SHOW YOUR OPINION OF THIS	--mark an X in one of the opinion columns.
U DO TO CUT DOWN ON THE AMOUNT	
BAGE IN THE TRASH CAN.	
SE THINGS THAT CAN'T BE RECYCLED.	
INGS TO BE RECYCLED.	
ECYCLE ANYTHING.	
N YOUR CHOICES. YOU MAY CHOOSE MORE	--mark an X on B and C.
4-25) The Recycling Payoff Game.	
EN WE PLAYED THE RECYCLING PAYOFF RILLED FOR OIL, GOLD, LEAD, AND S.	
D SHOW YOUR OPINION OF THIS ACTIVITY.	--mark an X in one of the opinion columns.
E BEST WAY TO WIN THE GAME?	
D.	
YOUR RIG.	
R RIG.	
R LAND.	

MATERIALS

TEACHING STRATEGIES

MARK AN X ON YOUR CHOICE.

Collect Worksheet 4-14.

Tell the students that tomorrow they can talk about the answers to the questions on the four worksheets. Then if they want to work again on any activity they talked about today, they may do so.

After class, turn to the Responsibilities and Accomplishments page of the Student Record of Progress and enter your judgment of each student's interest and involvement in science. Then, use an extra set of worksheets for Part I to tally the student ratings of each of the activities.

Look for the most popular and least popular activities. Then look over each worksheet to find out which students indicated the least interest in science. Compare this with your own ratings of each student's interest.

If you have students who frequently indicated disinterest, dislike, or no memory for a number of activities, it is possible that they are trying to indicate personal, social, or emotional problems rather than simply that they don't like science. Bear in mind that part of the problem might be you -- a personality conflict that may not be easily resolved. Whatever the cause, these students need attention and understanding. Look at your records of background and understanding for clues. Visit their homes. Review their school placement. In the next unit try to draw them into the activities. Use Tallysheet 4-8 to summarize student responses to the questions on Worksheets 4-11 through 4-14. Then use the tallysheet and the guidelines that follow (preceeding Part II of this activity) to record the results on Worksheets 4-11, 4-12, 4-13, and 4-14. As you record the results,

TEACHING STRATEGIES

X ON YOUR CHOICE.

sheet 4-14.

dents that tomorrow they can talk about the he questions on the four worksheets. Then to work again on any activity they talked they may do so.

turn to the Responsibilities and nts page of the Student Record of Progress ur judgment of each student's interest ent in science. Then, use an extra set s for Part I to tally the student ratings he activities.

most popular and least popular activities. er each worksheet to find out which icated the least interest in science. with your own ratings of each student's

students who frequently indicated dis- slike, or no memory for a number of it is possible that they are trying to sonal, social, or emotional problems simply that they don't like science. that part of the problem might be you -- conflict that may not be easily resolved. cause, these students need attention and g. Look at your records of background and g for clues. Visit their homes. Review placement. In the next unit try to draw e activities. Use Tallysheet 4-8 to dent responses to the questions on -11 through 4-14. Then use the tallysheet elines that follow (preceeding Part II vity) to record the results on Worksheets -13, and 4-14. As you record the results,

ANTICIPATED STUDENT BEHAVIORS

Students should:

--mark an X on B.

MATERIALS

TEACHING STRATEGIES

write occasional comments or words of praise on the worksheets (which should be returned to the students the next day).

Guidelines for Scoring Worksheets 4-11, 4-12, 4-13, and 4-14.

The outline below will assist you in scoring student responses on Tallysheet 4-8.

Questions 5, 11, 13, 14, 15, 16, and 17: Circle the letters that each student marks.

Question 1: Circle the number of things that each student listed as going into compost.

Question 2. Circle SNAKE and/or GRASS if the student marked them. Circle OTHER for any other answer the student marked.

Question 3. Circle YES if the student indicates that the body-building material was passed to the hair by eating the meat from the cow. Otherwise, circle NO.

Question 4: Circle YES if the student indicates some effect on other plants and/or animals. Otherwise, circle NO.

Question 6: Under the column marked "Name," circle YES if the student correctly names the animal. Otherwise, circle NO. Under the column marked "Function," circle YES if the student indicated that the animal ate the leaves. Otherwise, circle NO.

Question 7: Under the column marked "Decomposed," circle the number of things the student listed as things that were decomposed. Under the column marked "NOT Decomposed," circle the number of things that the student listed as things that were not decomposed.

TEACHING STRATEGIES

comments or words of praise on the
h should be returned to the students

coring Worksheets
, and 4-14.

w will assist you in scoring student
lysheet 4-8.

13, 14, 15, 16, and 17: Circle the
h student marks.

cle the number of things that each
s going into compost.

cle SNAKE and/or GRASS if the student
rcle OTHER for any other answer the

cle YES if the student indicates that
g material was passed to the hair by
from the cow. Otherwise, circle NO.

cle YES if the student indicates some
plants and/or animals. Otherwise,

er the column marked "Name," circle YES
orrectly names the animal. Otherwise,
r the column marked "Function," circle
nt indicated that the animal ate the
se, circle NO.

er the column marked "Decomposed,"
r of things the student listed as
decomposed. Under the column
mposed," circle the number of things
listed as things that were not

ANTICIPATED STUDENT BEHAVIORS

MATERIALS

TEACHING STRATEGIES

Question 8: Circle YES if the student wrote microbes. Otherwise, circle NO.

Question 9: Circle YES if the student marked wet. Otherwise, circle NO.

Question 10: Circle YES if the student marked the classroom. Otherwise, circle NO.

Question 12: Circle YES if the student wrote decomposer.

Guidelines for Interpretation and Recording in the Student Record of Progress

The items in this review assess an understanding of the concepts in this unit. Some, in addition, assess a higher level of abstract thinking and are used to identify the students who have developed their reasoning skills.

The following instructions will help you interpret scores and record results in the Student Record of Progress.

Question 1 assesses the student's understanding of the concept of compost and his memory regarding what things were put into the compost pile. Turn to the Concepts page of the Student Record of Progress and find the column marked "Activity 4-28, Compost." Based on the number of things that your class added to the compost piles, rate each student's response as HIGH, SOME, or LOW.

Question 2 assesses the student's understanding of the concept of food chains. Find the column marked "Activity 4-28, Food Chains" on the concepts page. Circle HIGH if the student marked both SNAKE and GRASS. Circle SOME if he/she marked one of the two. Circle LOW if he/she marked neither of the two.

TEACHING STRATEGIES

: Circle YES if the student wrote microbes.
circle NO.

: Circle YES if the student marked wet.
circle NO.

: Circle YES if the student marked the
Otherwise, circle NO.

: Circle YES if the student wrote

for Interpretation and Recording
ent Record of Progress

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this unit. Some, in addition, assess a
l of abstract thinking and are used to
e students who have developed their
kills.

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ge of the Student Record of Progress
e column marked "Activity 4-28, Compost."
e number of things that your class added
ost piles, rate each student's response as
or LOW.

assesses the student's understanding of the
food chains. Find the column marked
-28, Food Chains" on the concepts page.
if the student marked both SNAKE and
cle SOME if he/she marked one of the two.
if he/she marked neither of the two.

ANTICIPATED STUDENT BEHAVIORS

MATERIALS

TEACHING STRATEGIES

Question 3 assesses the student's understanding of the concept of the transfer of body-building materials from one organism to another. Find the column marked "Activity 4-28, Long Journey" on the Concepts page. Circle YES if the student answered question 3 correctly.

Question 4 assesses the student's understanding of the concept of food webs. In addition, this question assesses a student's ability to predict outcomes. Because predicting outcomes involves a higher degree of abstract thinking, some students will not be successful in this task. Students who are not able to predict outcomes will need time and many experiences to develop these skills. Find the column marked "Activity 4-28, Food Web" on the Concepts page. Circle YES if the student's answer indicates that other animals would be affected in some way, such as going hungry or dying. Otherwise, circle NO.

Question 5 assesses the student's understanding of the concept of interdependence of living things. Find the column marked "Activity 4-28, Interdependence" on the Concepts page. Circle YES if the student marked both choices A and B. Otherwise, circle NO.

Question 6 assesses the student's understanding of the concept of decomposers. Find the column marked "Activity 4-28, Decomposers" on the Concepts page. Circle YES if the student had indicated the function of decomposers. Otherwise, circle NO.

Question 7 assesses the student's understanding of planting in compost by asking students which items decomposed and which did not. Find the column marked "Activity 4-28, Planting in Compost" on the Concepts page. Based upon the number of things in each category in your class, rate each student's response as HIGH, SOME, or LOW.

TEACHING STRATEGIES

es the student's understanding of the ansfer of body-building materials to another. Find the column marked ong Journey" on the Concepts page. student answered question 3 correctly.

es the student's understanding of the ebs. In addition, this question t's ability to predict outcomes. g outcomes involves a higher degree of , some students will not be successful udents who are not able to predict outime and many experiences to develop nd the column marked "Activity 4-28, Concepts page. Circle YES if the indicates that other animals would be way, such as going hungry or dying. NO.

es the student's understanding of the ependence of living things. Find the tivity 4-28, Interdependence" on the ircle YES if the student marked both Otherwise, circle NO.

es the student's understanding of the osers. Find the column marked "Activity on the Concepts page. Circle YES indicated the function of decomposers. NO.

es the student's understanding of t by asking students which items ch did not. Find the column marked anting in Compost" on the Concepts the number of things in each category e each student's response as HIGH,

ANTICIPATED STUDENT BEHAVIORS

MATERIALS

TEACHING STRATEGIES

Question 8 assesses the student's understanding of the concept that microbes breathe. Find the column marked "Activity 4-28, Things that Breathe" on the Concepts page. Circle YES if the student had indicated that it was microbes that were breathing. Otherwise, circle NO.

Questions 9 and 10 assess the student's understanding of the concept of the conditions which contribute to the decomposition of food. Find the column marked "Activity 4-28, Decomposing Conditions" on the Concepts page. Circle YES if the student marked both Questions 9 and 10 correctly. Otherwise, circle NO.

Question 11 assesses the student's understanding of the concept that yeast causes bread to rise. Find the column marked "Activity 4-28, Baking Bread" on the Concepts page. Circle YES if the student marked choice A. Otherwise, circle NO.

Question 12 assesses the student's understanding of the concept of food cycles. Find the column marked "Activity 4-28, Food Cycles" on the Concepts page. Circle YES if the student wrote decomposer. Otherwise, circle NO.

Question 13 assesses the student's understanding of the concept of the amount and look of garbage we produce. Find the column marked "Activity 4-28, Garbage." Circle YES if the student marked choices B and C. Otherwise, circle NO.

Question 14 assesses the student's understanding of the concept that some things in garbage decompose, while others do not. Find the column marked "Activity 4-28, Decomposers" on the Concepts page. Circle YES if the student marks choices C, D, and E and no others as things that will decompose. Otherwise, circle NO.

Question 15 assesses the student's understanding of the concept of recycling. Find the column marked "Activity 4-28, Recycling" on the Concepts page. Circle YES if the student marks choices A, B, C, and E and no others as

TEACHING STRATEGIES

n 8 assesses the student's understanding of the
that microbes breathe. Find the column marked
ty 4-28, Things that Breathe" on the Concepts
Circle YES if the student had indicated that it
robes that were breathing. Otherwise, circle NO.

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cept of the conditions which contribute to the
sition of food. Find the column marked "Activity
ecomposing Conditions" on the Concepts page.
YES if the student marked both Questions 9 and 10
ly. Otherwise, circle NO.

n 11 assesses the student's understanding of the
that yeast causes bread to rise. Find the
marked "Activity 4-28, Baking Bread" on the
s page. Circle YES if the student marked choice
erwise, circle NO.

n 12 assesses the student's understanding of the
of food cycles. Find the column marked "Activity
ood Cycles" on the Concepts page. Circle YES
student wrote decomposer. Otherwise, circle NO.

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e column marked "Activity 4-28, Garbage." Circle
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NO.

n 14 assesses the student's understanding of
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o not. Find the column marked "Activity 4-28,
ers" on the Concepts page. Circle YES if the
marks choices C, D, and E and no others
s that will decompose. Otherwise, circle NO.

n 15 assesses the student's understanding of the
of recycling. Find the column marked "Activity
cycling" on the Concepts page. Circle YES if the
marks choices A, B, C, and E and no others as

ANTICIPATED STUDENT BEHAVIORS

things that could have been recycled. Otherwise, circle NO.

Question 16 assesses the student's understanding of the concept of how to reduce the amount of garbage. Find the column marked "Activity 4-28, Less Garbage" on the Concepts page. Circle YES if the student marked choices B and C and no others as ways to reduce the amount of garbage. Otherwise, circle NO.

Question 17 again assesses the concept of recycling. Recycling in this case is assessed in terms of the best way to win the Recycling Payoff Game. Find the column marked "Activity 4-28, Recycling Payoff Game" on the Concepts page. Circle YES if the student marked B, Recycle Your Rig, as the best way to win the game. Otherwise, circle NO.

Part II.

As you return the worksheets from Part I to the students, congratulate them on what they have learned.

> FOR A LITTLE WHILE LET'S TALK ABOUT THE QUESTIONS YOU ANSWERED. AS WE GO ALONG, I WILL TELL YOU WHICH ACTIVITIES WERE THE MOST POPULAR. YOU CAN CHOOSE A FEW FAVORITES TO DO AGAIN IF YOU WOULD LIKE. NOW LOOK AT QUESTION 1. WHO WANTS TO TELL THE ANSWER?

GIVE SEVERA
STUDENTS A CH
TO RESPOND

If for Question 1, or later questions, some students have a reasonable justification for an answer that you had

TEACHING STRATEGIES

have been recycled. Otherwise, circle

ses the student's understanding
how to reduce the amount of garbage.
arked "Activity 4-28, Less Garbage" on
. Circle YES if the student marked
nd no others as ways to reduce the
. Otherwise, circle NO.

assesses the concept of recycling.
case is assessed in terms of the best
cycling Payoff Game. Find the column
4-28, Recycling Payoff Game" on the
ircle YES if the student marked B,
as the best way to win the game.
NO.

worksheets from Part I to the students,
on what they have learned.

WHILE LET'S TALK ABOUT THE
U ANSWERED. AS WE GO ALONG, I
U WHICH ACTIVITIES WERE THE
. YOU CAN CHOOSE A FEW FAVORITES
IF YOU WOULD LIKE. NOW LOOK AT
WHO WANTS TO TELL THE ANSWER?

GIVE SEVERAL STUDENTS A CHANCE TO RESPOND

or later questions, some students have
fication for an answer that you had

ANTICIPATED STUDENT BEHAVIORS

Students should:

--raise hands to tell things that were put in the compost.

MATERIALS

TEACHING STRATEGIES

scored incorrect, be sure to change your rating and prais their good thinking.

Discuss each of the questions fully, allowing students to give all their various answers and giving them the opportunity to decide which is correct. Have students challenge and defend the answers. (Refer to guidelines for scoring the worksheets for acceptable answers to each question.) For each question, discuss the popularit of the activity it was drawn from and let students choose several activities to repeat if they wish.

Please send all student worksheets and Tallysheet 4-8 to BSCS.

TEACHING STRATEGIES

orrect, be sure to change your rating and praise
thinking.

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eir various answers and giving them the
to decide which is correct. Have students
nd defend the answers. (Refer to guidelines
the worksheets for acceptable answers to
on.) For each question, discuss the popularity
vity it was drawn from and let students choose
tivities to repeat if they wish.

all student worksheets and Tallysheet 4-8

ANTICIPATED STUDENT BEHAVIORS

Upon completion of this activity, each student should, as a minimum:

--have participated in a review of Unit IV
--have responded to Worksheets 4-11 through 4-14
--have participated in a discussion of answers to the questions on the worksheets.

Activity name suggested by class:

Teacher ____________________

BSCS USE: Post___ Tally___ Rev___

		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes preparing for each day's science class						
4.	Students absent on each date (Use ID Number)						

5. Student interest: Check the portion of your class in each category.

	NONE	UP TO: 1/4	1/2	3/4	ALL
HIGH INTEREST					
MODERATE INTEREST OR INDIFFERENCE					
RESISTANCE OR DISLIKE					

6. Equipment problems? In kit? ☐ No ☐ Yes Obtained by you? ☐ No ☐ Yes
If problems, what were they and how would you resolve them?

7. Did students have difficulty understanding any concepts or vocabulary?
☐ No ☐ Yes -- Pages and Problem:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is ☐ Of value--needs the revision suggested ☐ Worth salvaging--make major changes described ☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s)______________ Comment:

Specific Questions:

12. Were there any activities which few of the students recalled?

13. How do the students react to these assessment sheets?

BSCS Evaluation:

8. Will the knowledge gained from this activity be something the students will use in their everyday life? If not, how could the activity be made more practical?

9. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -- Pages and Problem:

10. Did you omit any part(s) of this activity? ☐ Yes ☐ No -- Identify which part(s) were omitted and WHY:

11. Your rating of this activity:
☐ Worthwhile --keep as is
☐ Of value--needs the revision suggested
☐ Worth salvaging--make major changes described
☐ Worthless --drop it

If revision is suggested, what parts of this activity should be retained unchanged when the curriculum is revised? Page(s)______________ Comment:

Specific Questions:

12. Were there any activities which few of the students recalled?

13. How do the students react to these assessment sheets?

14. Please send in Tallysheet 4-8 and Worksheets 4-11 through 4-14.

BSCS Evaluation: EMH Feedback Form 1d

Side A

Teacher ______________________________

A. In the space below tell what went right, what went wrong, what you did to make the activity a success, and specifically how you would rewrite the activity. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide along with this form.

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

BSCS Evaluation: EMH Feedback Form 1d

B. What anecdotes of student learning did you see or hear in your classroom?

C. Concern (or questions) about content:

D. Messages for staff (we will read and respond immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, tallysheets, etc?

Side B

1. Was the background information for this core clear and useful? ☐ Yes ☐ No
Comment:

2. Was there too much preparatory reading and too many directions given to the teacher? ☐ Yes ☐ No
Comment:

3. Was it clear to you why these particular activities were chosen and the direction they were leading? ☐ Yes ☐ No

4. How would you increase the clarity of this core for students? (Help them understand why they are doing these activities.)

5. Is there a practical (take-home) value for your students in these activities? ☐ Yes ☐ No If yes, what do you see as the "take-home" lesson? If no, what is needed?

6. In these materials, what things did your students find difficult to do?

7. Comment about the amount of reading and writing required of students. Should there be more or less in this core?

8. Were the Clues to Success and Student Record of Progress helpful in this core? ☐ Yes ☐ No If helpful, how are they helpful?

9. Did you make use of the Planning Guide included in the introductory material for this core? ☐ Yes ☐ No
Comment:

10. During this core was class time taken for students to observe the pond, pets, or plants; play games from earlier activities, or explore science ideas not in the materials? ☐ Yes ☐ No
Comment:

11. If you could teach your way, rather than following the Guide, how would you do it?

12. Did the activities fulfill the purposes described by the core objectives and rationale? ☐ Yes ☐ No
Comment:

what is needed?

6. In these materials, what things did your students find difficult to do?

7. Comment about the amount of reading and writing required of students. Should there be more or less in this core?

8. Were the Clues to Success and Student Record of Progress helpful in this core?
☐ Yes ☐ No If helpful, how are they helpful?

9. Did you make use of the Planning Guide included in the introductory material for this core? ☐ Yes ☐ No
Comment:

10. During this core was class time taken for students to observe the pond, pets, or plants; play games from earlier activities, or explore science ideas not in the materials? ☐ Yes ☐ No
Comment:

11. If you could teach your way, rather than following the Guide, how would you do it?

12. Did the activities fulfill the purposes described by the core objectives and rationale? ☐ Yes ☐ No
Comment:

13. Which of your students do you believe were unsuccessful in achieving the objectives of this core of activities? Explain:

BSCS Evaluation: EMH Feedback Form 2a

NEW STUDENTS ENTERING DURING THIS CO

Date Entered	Last Name	Name Used	Ethnic Group	Sex	Birthdate	Test Date	Tes
			W B S O	M F			W B
			W B S O	M F			W B
			W B S O	M F			W B
			W B S O	M F			W B
			W B S O	M F			W B
			W B S O	M F			W B

W = white
B = black
S = Spanish-American
O = other

W=WIS
B=Bin
O=Oth
(Na

STUDENTS DROPPED IN THIS PERIOD

Date Dropped	Last Name	First	Reason for Dropping

NEW STUDENTS ENTERING DURING THIS CORE

c Group	Sex	Birthdate	Test Date	Test	Total	Verbal	Performance	Previous Test Score
S O	M F			W B O				
S O	M F			W B O				
S O	M F			W B O				
S O	M F			W B O				
S O	M F			W B O				
S O	M F			W B O				

ite
lack
panish-
merican
her

W=WISC
B=Binet
O=Other
(Name)

Reason for Dropping

Me and my Environment

UNIT IV
TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT
CHANGE OF PACERS

*Camera *Film	1. Have students, working in groups of three or four, use a c with which to build a photographic food chain. To some gr the chain with man. Permit the more capable students to s the plant source. Encourage students to try for a chain a of students will be able to work at a time because of limi work between classes, during free periods, at lunch break,
	2. Build a food chain involving one of the classroom pets. U
*Labels and safety pins	3. Who am I? Pin cards on students' backs, without their see animal from the Food Chain Game. Students ask each other "Who do I eat?" in order to guess what plant or animal the
*Camera *Film	4. Students may wish to photograph the food web that has been than one student wishes to do this, a new arrangement of t Display the pictures on the bulletin board.
	5. Have the students determine which living things in the loc living things. Construct as long a list as possible. Example: Cats ------------ Rats Birds ----------- Insects Gulls ----------- Fish
*Baby food jars or similar small jars *Plastic bags	6. During the field trip (Activity 4-5) it might be possible or animals for their pond. Bring appropriate containers s etc.
	7. Plants collected on the field trip (Activity 4-5) may be us on the bulletin board.
*Map of world and/or United States	8. On a large U. S. or world map have the students write in th in the area(s) where they are most commonly found.

UNIT IV
NSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT
CHANGE OF PACERS

nts, working in groups of three or four, use a camera to take appropriate pictures to build a photographic food chain. To some groups you may give the hint to start with man. Permit the more capable students to start with any animal and proceed to source. Encourage students to try for a chain as long as possible. Only one group s will be able to work at a time because of limited equipment. Permit students to en classes, during free periods, at lunch break, and so forth. Activity 4-1

od chain involving one of the classroom pets. Use pictures or drawings. Activity 4-1

Pin cards on students' backs, without their seeing the card, to depict a plant or m the Food Chain Game. Students ask each other questions such as "Who eats me?" eat?" in order to guess what plant or animal they are. Activity 4-1

ay wish to photograph the food web that has been constructed on the floor. If more tudent wishes to do this, a new arrangement of the cards could be used to build a web. e pictures on the bulletin board. Activity 4-4

tudents determine which living things in the local environment feed on which other ngs. Construct as long a list as possible. Activity 4-4

Example:
Cats ------------ Rats
Birds ----------- Insects
Gulls ----------- Fish

field trip (Activity 4-5) it might be possible for the students to collect plants for their pond. Bring appropriate containers such as jars, plastic bags, water, Activity 4-5

lected on the field trip (Activity 4-5) may be used to make an interesting display letin board. Activity 4-5

U. S. or world map have the students write in their names of the animals studied a(s) where they are most commonly found. Activity 4-6

*Magazine pictures	9. Have students collect pictures of wild animals in ot together on a bulletin board and connected with line group lion, zebra, antelope, hyena, etc.
*Magazine pictures	10. Students could make a bulletin board with pictures o animals seen in slides.
*Plastic shoe box *Pill bugs *Cardboard divider *Dead leaves *Damp sponge *Drying agent - borax, silica gel	11. An experiment could be conducted to discover whether place a cardboard divider in the middle of a plastic bottom of the divider to allow pill bugs to walk thr etc., on either side of the divider, but place a dam A drying agent can be placed in a corner of the "dry would be silica gel, borax, or calcium chloride. (S observe the pill bugs to see which side of the box t
Microscope Microscope slides *Compost	12. Have students look at any mold in the compost under
	13. Invite a professional gardener, hobby gardener, or n class about the preparation, use, and benefits of co composting should be stressed.

UNIT IV
TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT
CHANGE OF PACERS

BSCS

students collect pictures of wild animals in other parts of the world, to be grouped ther on a bulletin board and connected with lines showing a possible food web; e.g., lion, zebra, antelope, hyena, etc.	Activity 4-6
nts could make a bulletin board with pictures of decomposers and scavengers, including ls seen in slides.	Activity 4-8
periment could be conducted to discover whether pill bugs perfer wet or dry environments: a cardboard divider in the middle of a plastic shoe box, with small holes cut in the m of the divider to allow pill bugs to walk through. Place similar amounts of leaves, on either side of the divider, but place a damp sponge on one side and not the other. ing agent can be placed in a corner of the "dry" compartment. A suitable drying agent be silica gel, borax, or calcium chloride. (See Diagram CP 4-1.) Students should ve the pill bugs to see which side of the box they spend the most time in.	Activity 4-9
students look at any mold in the compost under the microscope.	Activity 4-10
a professional gardener, hobby gardener, or nurseryman who uses compost to speak to the about the preparation, use, and benefits of composting. The recycling aspects of sting should be stressed.	Activity 4-10 Activity 4-11

UNIT IV
TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMEN
CHANGE OF PACERS

Agar Petri dishes *Water *Pan *Hot plate *Q-tips *Compost *Incubator or warm place	14. It might be a good review for students to make agar plates biology teacher in your school may be a good source of aga students wipe Q-tips in the compost and then on the surfac a warm place. Students who missed Unit II, or cannot reca the compost microbes growing.
*Materials in 14 *Refrigerator	15. Make agar plates with compost microbes as suggested in 14 refrigerator and one in a warm place. This will be useful Unit II.
*Magazine pictures	16. Have students make a bulletin board display using advertis according to where they are stored: refrigerator, cool dr
	17. Visit the school cafeteria and compare the food-storing pr grocery store the class visited.
	18. Divide the class into groups of two, three, or four. Have you note to the manager of the grocery store visited by th
	19. Arrange a field trip to a canning or bottling factory to s taken against spoilage.
	20. The bread-making activity will probably get students inter lessons more baking may be tried with other yeast recipes, cooking lessons. Boys as well as girls may well enjoy thi

a good review for students to make agar plates as described in Unit II. (The her in your school may be a good source of agar if you have none left.) Have e Q-tips in the compost and then on the surface of the agar, and incubate in . Students who missed Unit II, or cannot recall it, will be interested to see microbes growing.	Activity 4-12
ates with compost microbes as suggested in 14 above, and store one in the and one in a warm place. This will be useful for students who have missed	Activity 4-14
s make a bulletin board display using advertisements. Group food products where they are stored: refrigerator, cool dry cabinets, etc.	Activity 4-15
hool cafeteria and compare the food-storing procedures with those of the e the class visited.	Activity 4-15
lass into groups of two, three, or four. Have the groups write a thank the manager of the grocery store visited by the class. Give help as needed.	Activity 4-15
eld trip to a canning or bottling factory to study the procedures and measures t spoilage.	Activity 4-15
king activity will probably get students interested in cooking. In other baking may be tried with other yeast recipes, and this could lead into regular ons. Boys as well as girls may well enjoy this.	Activity 4-17

Food Chain Game cards *Pin *Cardboard *Scissors	21.	If students have difficulty understanding food cycle might help. Cut two large circles out of cardboard, through which a large pin could be pushed to make an window near the edge of one circle large enough to s food cycle made of Food Chain Game cards around the way that they will show through the window of the fi together, rotate the top circle as you describe the
*Magazine pictures	22.	Have students find pictures of animals to make into complete the cycle.
Spring scale	23.	Have students collect trash from the wastebaskets in what is collected.
Spring scale *Plastic bags to use as gloves	24.	Open one or more bags of classroom trash and have st as paper, glass, plastic, metal, food. These catego biodegradable and nonbiodegradable materials.
Spring scale	25.	Weigh the trash from the lunch room after one lunch total over a period of weeks or months.
*Camera and film	26.	Photograph and/or display the bags of trash that hav the total school trash for one day.

UNIT IV
TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT
CHANGE OF PACERS

BSCS

tudents have difficulty understanding food cycles, the construction of a cardboard "cycle" t help. Cut two large circles out of cardboard, and make a small hole in the center ugh which a large pin could be pushed to make an axle. (See Diagram CP 4-2.) Cut a ow near the edge of one circle large enough to show a Food Chain Game card. Stick a cycle made of Food Chain Game cards around the edge of the other circle, in such a that they will show through the window of the first circle. When they are pinned ther, rotate the top circle as you describe the food cycle to the students.	Activity 4-1
students find pictures of animals to make into food cycles, with the decomposer card to ete the cycle.	Activity 4-1
students collect trash from the wastebaskets in a classroom other than their own. Weigh is collected.	Activity 4-2
one or more bags of classroom trash and have students sort trash into categories such per, glass, plastic, metal, food. These categories could be weighed and grouped into gradable and nonbiodegradable materials.	Activity 4-2
the trash from the lunch room after one lunch period or one day. Speculate about the over a period of weeks or months.	Activity 4-2
graph and/or display the bags of trash that have been collected. If possible, photograph otal school trash for one day.	Activity 4-2

Spring scale *Plastic bags to use as gloves	27. If students' interest in garbage warrants it, have student and weigh each category with the spring scale to find whic come either from your home or from the students' homes.
*Booklet, *The Processing and Recovery of Jon Thomas -- Cool Cat*, 1 Copy per student *Opaque projector	28. Obtain copies of *The Processing and Recovery of Jon Thomas* some bookstores and can also be purchased from the Superin Government Printing Office, Washington, D. C. 20402. Pri The booklet is one that can be enjoyed by adult and child the understanding of poor readers. Using an opaque projec the class. Have several copies so students can follow the
*Camera and film	29. Use a camera to make a pictorial essay of the daily activi
	30. Have students photograph the art objects they have created
	31. Exhibit the students' art work in an appropriate place in school showcase. Actively involve students in planning an exhibit.

' interest in garbage warrants it, have students sort real garbage into categories, ach category with the spring scale to find which is heaviest. The garbage could from your home or from the students' homes.	Activity 4-22
es of *The Processing and Recovery of Jon Thomas -- Cool Cat*. This is available in ores and can also be purchased from the Superintendent of Documents, U. S. Printing Office, Washington, D. C. 20402. Price $0.55, Stock Number 5502-0084. is one that can be enjoyed by adult and child alike, and has cartoons to help anding of poor readers. Using an opaque projector, read and discuss the story with Have several copies so students can follow the story.	Activity 4-23
a to make a pictorial essay of the daily activities at the local dump.	Activity 4-23
ts photograph the art objects they have created.	Activity 4-26
students' art work in an appropriate place in the school, such as the case. Actively involve students in planning and setting up the	Activity 4-26